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Quantitative Analysis of Entrepreneurial Attitudes in Technical (Engineering) Students: Evidence from Uttar Pradesh

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ABSTRACT
The evolving landscape of the economy and the shifting demands of the workforce have spurred numerous engineering institutions to contemplate integrating entrepreneurshipeducation into their curriculum. This integration is not merely an additional component but a synergistic and integral aspect of an engineering education. The primary purpose of this research paper is to study the demographic traits of engineering students and to identify their personality attributes. A total of 177 final-year university students from five different universities, mainly Dr. A.P.J. Abdul Kalam Technical University, Babu Banarasi Das University (BBD), Shri Ramswaroop Memorial College of Engineering & Management, and Baba Saheb Bhim Rao Ambedkar University (BBAU), and Integral University, were selected as respondents. Quantitative data were obtained via a self-evaluation questionnaire and analyzed using the Chi-Square method. The study reveals that engineering students are more interested in exploring entrepreneurship as a career choice. The study concluded that engineering students view entrepreneurship as a promising solution to address unemployment. However, universities must provide students with the necessary skills and knowledge to establish a business. The government should provide a favorable business climate and the essential infrastructure for establishing a new business.

Keywords: Entrepreneurship, Engineering, Education, Unemployment, Career.

Introduction

About 60 percent of India's population is between 15 and 59 years of age, which is considered economically the energetic age group (Sanghi, S. & Srija, A., 2016). In addition, it is estimated that 6 to 8 million young people are expected to join the labor force over the next ten years (Mundle, S., 2017). This means there's a massive need for more and more employment generation to keep up with the changing times. To address this issue, the government of India has recently taken several policy-level initiatives, such as the Startup India and Skill India campaigns, to encourage the spirit of entrepreneurship, particularly among young people. Consequently, entrepreneurship has gained considerable prominence, becoming ubiquitous in discussions among economists, university students, academics, and policymakers. (Keat, Selvarajah & Meyer, 2011). In the current era of globalization, entrepreneurship stands as a widely recognized and potent approach to driving a nation's economic development, facilitating sustainable

growth, and bolstering its competitive edge. Globally, workshops, conferences, and seminars are organized annually, placing substantial emphasis on the significance of entrepreneurship in the context of national development, societal progress, and individual growth. Nevertheless, the success of such initiatives is influenced by several factors. The key to the practical and successful implementation of these initiatives and achieving the necessary outcomes regarding improved employment creation will result in more significant GDP growth. This paper investigates engineering students' demographic traits and examines their personality attributes. Specifically, it aims to determine the relevance of the courses offeredin education programs to the engineering student's interest in becoming an entrepreneur and its adequacy. Furthermore, it seeks to identify the training skills necessary for successful entrepreneurship. To achieve this goal, previous research studies and literature reviews on entrepreneurship theories have been studied as the basis for the study of the career choice of engineering students. The research question seeks evidence of the significant impact of “entrepreneurship education” and “personal interests” on the student's entrepreneurial aspirations.

Review of literature

It is widely accepted that entrepreneurship is a viable career option for many individuals, according to research conducted by Morris, Lewis & Sexton (1994), Bird (1988), and Mitchell (2005). Empirical evidence further reinforces that a strong need for achievement contributes to entrepreneurial success. Consequently, fostering achievement motivation among students to promote entrepreneurship within an economy is imperative.

According to the 2016 Global Entrepreneurship Monitor (GEM) survey conducted across 60 countries, 66% of young individuals view entrepreneurship as a favorable career choice, with half believing they possess the necessary skills. In light of the demonstrably positive outcomes associated with entrepreneurship in the past decade, many emerging economies are now turning to entrepreneurship as a viable solution toaddress critical issues such as soaring unemployment rates, an oversupply of graduates, stagnant economic growth, and the incapacity of both public and private sectors to create employment opportunities for recent graduates. The remarkable surge of entrepreneurship in rapidly developing nations like India is compelling evidence of its magnitude and potential impact on the economy.

Taking a technology-based entrepreneurship course can provide students with a valuable educational experience. Students can gain practicalinsights into the complexities and realities of starting and running a high-tech business by simulating the entrepreneurial journey. This first-hand experience helps them to understand the demands, risks, and rewards associated with entrepreneurship, enabling them to make informed decisions about their career paths Duval- Reed-Rhoads, T. & Haghighi, S. (2011). The role of higher education in developing competence for sustainable entrepreneurship is essential. Entrepreneurship educationtypically finds its place within the curriculum of business schools, while education focusedon sustainable development is commonly delivered by faculty specializing in environmental education. However, not much work from an educational perspective examines and/or bridges the gap between these two disciplines, much less work in which an attempt is made to incorporate these perspectives.

Entrepreneurial Intention (EI) refers to an individual's enthusiasm and primary inclination to establish a new business venture. It involves the passion for self-employment, initiating a business activity, and striving for success. Engle, R. L., Dimitriadi, et al. Intention serves as a precursor to action. Without intention, it is unlikely that an individual will take the necessary steps to become an entrepreneur (Bird, B. & Jelinek, M.

The intentional process begins with a person's desires, customs, habits, needs, and ethics, shaping their intention to become an entrepreneur. Research suggests that individuals with higher self-confidence, risk-taking propensity, and independence are likelier to exhibit entrepreneurial intention. According to Ajzen.I (1991) indicate that individuals with a high level of intention are more probable to exhibit corresponding behaviors. Furthermore, individuals who are confident, independent, and willing to take risks generally demonstrate greater intention to become entrepreneurs Autio, E., Keeley, et al . Engineering students have been observed to possess a strong inclination towards entrepreneurship when compared to other factors such as innovativeness, self-confidence, need for achievement, autonomy, the internal locus of control and risk-taking. This inclination towards self-employment reflects their preference for self-employment over wage employment. However, these students often face challenges in accessing capital, building social networks, and acquiring the necessary information to start their entrepreneurial ventures. According to Siti et al. (2019), the researchers aimed to measure the Entrepreneurship Traits (ET) construct, explicitly focusing on engineering students in Malaysia. Through exploratory factor analysis (EFA), the study identified two magnitudes of Entrepreneurship Traits (ET): social and cultural cognizance and perseverance. These magnitudes were measured using nine items created for the study. Reliability analysis demonstrated strong internal consistency (Cronbach's Alpha) for both aspects of the ET construct. The validation process and scale development ensured the stability and internal consistency of the new ET instrument across diverse samples. The goodness-of-fit index for the ET measurement model affirmed its accurate alignment with the data, and the confirmatory factor analysis (CFA) yielded a path model that met the necessary fitness criteria.

As stated by Amran et al. in 2014, the pivotal factors shaping entrepreneurial career choices among polytechnic students are economic, environmental conditions, and the Theoryof Planned Behavior (TPB). The economic environment provides opportunities for market exploration, growth potentials, financial availability, and venture creation, significantly affecting students' intentions to choose entrepreneurship as their career path. A research study conducted in India by Roy et al. (2017) aims to explore the factors influencing entrepreneurial intention among science and technology students. The study extends the Theory of Planned Behavior (TPB) and identifies various factors impacting entrepreneurial intention. The findings highlight that attitude towards entrepreneurship significantly predicts entrepreneurial intention among these students. Subjective norms and perceived behavioral control, including self-efficacy and feasibility, are also essential in shaping entrepreneurial intentions. Additionally, entrepreneurial education and exposure influenced the entrepreneurial intention of science and technology students significantly.

Objectives of the Study

The primary objectives of this study are as follows:

1. To study the demographic traits of engineering students
2. To study the personality attributes of engineering students.

Research Methodology

This study is exploratory in examining the interests of engineering students choosingntrepreneurship as a career choice. Survey Questionnaires were created based on the theory of planned behavior. The primary data was collected from five eminent Universities in Lucknow, mainly Dr. A.P.J. Abdul Kalam Technical University, Babu Banarasi Das University (BBD), Shri Ramswaroop Memorial College of

Engineering & Management, Baba Saheb Bhim Rao Ambedkar University (BBAU) and Integral University. The sample was about 200 responses, but 23 were removed as outliers and missing data. A stratified Sampling method was used. The chi-square test was used to study engineering students' demographic traits and personality attributes.

Data Analysis and Result of the Study

Profiles of Respondents

Variable		**Frequency**	**Percentage**
Gender	Male	111	67.6
	Female	66	32.4
Age	18-20 years	64	28.7
	21-23years	79	56.5
	24 -26 years	34	14.8
Father Occupation	Government Sector	29	16.89
	Private Sector	57	26.91
	Self Employed	91	56.2
Mother Occupation	Government Sector	23	14.8
	Private Sector	68	32.7
	Self Employed	86	52.5
Family Income (Annually)	Less Than 100000	19	13.9
	100000-300000	77	48.3
	300000 -600000	56	23.7
	600000 and more	25	14.1

Of the 177 respondents, 67.6 % were male, and 32.4% were female. A total of 28.7% of respondents fell in the age group of 18- 20 years, 56.5% fell in the age group of 21-23 years, and the remaining 14.8% fell in the age group of 24- 26. Furthermore, 16.89% of respondents' fathers are engaged in the government sector, 26.91% of respondents' fathers are envolved in the private sector, and 56.2% are engaged in the self-employed. 14.8% of respondents' mothers are engaged in the government sector, 32.7% of respondents' mothers are engaged in the private sector, and 52.5% of respondents' mothers are self-employed. Family yearly income of respondents less than 100000 is 13.9%, 100000-300000 is 48.3%,300000-600000 is 23.7%, and more than 600000 are 14.1%.

I want to be an entrepreneur.	**Frequency**	**Percentage**
Yes	139	79.1
No	38	20.9

Out of the 177 respondents, 79.1% of students are interested in becoming entrepreneurs, and the remaining 20.9% are not interested.

I am inspired to be an entrepreneur by	Frequency	Percentage
Family/Friends	67	21.1
Successful and established entrepreneurs	110	78.9

Out of 177 respondents**,** 21.1% were inspired by their family or friends to become entrepreneurs, and Successful and established entrepreneurs inspired the remaining 78.9%.

When would you like to start your own business	Frequency	Percentage
I have already started	36	19.7
After 1-2 years of completion of my studies	43	32.9
First, I will start with the job; then, after 1 or 2 years, I may go for business	98	47.4

Out of the 177 respondents, 19.7% have already started their own business, 32.9% plan to start their business 1 to 2 years after completing their studies, and 47.4% plan to start their business after initially working in a job for 1 or 2 years.

Chi-Square Analysis: Association between Demographic Factors of Respondents and their Personality Attributes for Entrepreneurship.

Ho 1 There is no significant association between respondents' gender and the Personality Attributes for Entrepreneurship.

Crosstab

			Personality Attributes for Entrepreneurship					
			Very Low Level	Low Level	oderate Level	High Level	Very High Level	Total
2. Gender	Male	Count	8	13	21	34	35	111
		% within 2.Gender	2.4%	10.5%	39.3%	30.9%	16.8%	100.0 %
	Fema le	Count	2	9	11	17	27	66
		% within 2.Gender	2.1%	14.7%	31.6%	30.6%	21%	100.0 %
Total		Count	10	22	32	51	62	177
		% within 2.Gender	3.8%	10.6%	36.5%	30.8%	18.3%	100.0 %

There are a total of 177 respondents, out of which 111 respondents were males and 66 werefemales.

- **Male:** 2.4% have a very low level, 10.5% have a low level, 39.3% have a moderate level, 30.9% have a high level, and 16.8% have a very high level of Personality Attributes for Entrepreneurship.
- **Female:** 2.1% have a very low level, 14.7% have a low level, 31.6% have a moderate level, 30.6% have a high level, and 21% have a very high level of Personality Attributes for Entrepreneurship.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.666[a]	4	.105
Likelihood Ratio	7.486	4	.112
Linear-by-Linear Association	.001	1	.979
N of Valid Cases	177		
a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 7.41.			

As the p-value can be seen as more than 0.005, the HO-1 is accepted.

Ho 2-There is no significant association between the Branch of respondents and the Personality Attributes for Entrepreneurship.

Crosstab

			Personality Attributes for Entrepreneurship					Total
			Very Low Level S	Low Level	Moderate Level	High Level	Very High Level	
6.Branch	Electronics and communication engineering (ECE)	Count	4	7	1	11	16	91
		% within 6.Branch	4.4%	13.2%	38.5%	26.4%	17.6%	100.0 %
	Computer science engineering(CSE)	Count	15	11	6	0	50	280
		% within 6.Branch	5.4%	11.4%	33.6%	31.8%	17.9%	100.0 %
	Mechanical engineering	Count	1	2	0	9	6	120
		% within 6.Branch	0.8%	7.5%	39.2%	30.8%	21.7%	100.0 %
	Civil engineering	Count	0	1	10	8	2	21
		% within 6.Branch	0.0%	4.8%	47.6%	38.1%	9.5%	100.0 %
	Chemical engineering	Count	0	2	7	5	3	17
		% within 6.Branch	0.0%	11.8%	41.2%	29.4%	17.6%	100.0 %
Total		Count	20	23	24	33	77	177
		% within 6.Branch	3.8%	10.6%	36.5%	30.8%	18.3%	100.0 %

There were 177 respondents in total, 11 of whom were in the Electronics and communication engineering (ECE) branch, 78 of whom were in the Computer science engineering (CSE) branch, 34 of whom were in the Mechanical engineering branch, 31 of whom were in the Civil engineering branch, and 23 of whom were in the Chemical engineering branch.

- **Electronics and communication engineering (ECE):** 4.4% have a very low level, 13.2% have a low level, 33.6% have a moderate level, 31.8% have a high level, and 17.9% have a very high level of Per-

sonality Attributes for Entrepreneurship.

- **Computer science engineering (CSE):** 5.4% have a very low level, 11.4% have a low level, 33.6% have a moderate level, 31.8% have a high level, and 17.9% have a very high levelof Personality Attributes for Entrepreneurship.
- **Mechanical engineering:** 0.8% have a very low level, 7.5% have a low level, 39.2% have a moderate level, 30.8% have a high level, and 21.7% have a very high level of Personality Attributes for Entrepreneurship.
- **Civil engineering:** 0.0% have a very low level, 4.8% have a low level, 47.6% have a moderate level, 38.1% have a high level, and 9.5% have a very high level of Personality Attributes for Entrepreneurship.
- **Chemical engineering:** 0.0% have a very low level, 11.8% have a low level, 41.2% moderate level, 29.4% have a high level, and 17.6% have a very high level of Personality Attributes for Entrepreneurship.

Table-Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.194[a]	16	.659
Likelihood Ratio	16.055	16	.449
Linear-by-Linear Association	2.138	1	.144
N of Valid Cases	177		
a. 8 cells (32.0%) have an expected count of less than 5. The minimum expected count is .64.			

As the p-value can be seen as more than 0.005, the HO-1 is accepted.

Conclusion

The findings from this study indicate that engineering students have a strong interest in exploring entrepreneurship. It was observed that students who had taken one or more entrepreneurship courses demonstrated significantly higher levels of entrepreneurial self-confidence compared to their peers who had not participated. Furthermore, these students were more likely to gain practical skills in market analysis, technology, commercialization, business communication, and internships with startup companies, which are highly sought-after by today's employers. Based on the insights gained from this research, it is advisable to integrate entrepreneurship education into engineering students, particularly in areas where innovative business and product ideas originate.

In policymaking, there should be a focused effort on educating young individuals about entrepreneurship driven by innovation. To accomplish this, policymakers should recognize that government initiatives can influence the creation of new businessesonly when they impact attitudes, entrepreneurial skills, and subjective norms. These elements have the potential to inspire young individuals to embark on the path of establishing promising enterprises.

Limitations of the Study

The main limitation of this study lies in sample size and the geographical area from which samples have been taken. This study focused only on the top five Lucknow(UP) universities. Future research is

suggested to consider a large Sample Size from more Cities in the Country. Future research can also be expanded on this topic by comparing the attitudes of engineering and non-engineering students and factors affecting technical students in choosing entrepreneurship as a career choice.

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