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Exploring Technopreneurial Intentions in Female Engineering Students: Influence of Need for Achievement and Innate Innovativeness

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ABSTRACT

Entrepreneurship has long been regarded as a crucial research field by economists and academics from around the world. Technology has a significant influence on business growth in today's culture. Aiming for a technology-based business is a way to create techno-entrepreneurs. The current study aims to develop the concept of technology-based entrepreneurship or technopreneurial inclination among female engineering students. The study establishes the effect of need for achievement and innate innovativeness in the formation of Technopreneurial Intention. Three central universities of Arunachal Pradesh are considered for the study. For the study, a 5-pont Likert scale-based questionnaire was employed. The targeted demographic was the subject of data collection via stratified random sampling. Data was gathered from the 160 female students. Structural equation modelling (SEM) with AMOS (version 26), was used for data analysis. The study demonstrated that both innate innovativeness and need for achievement have a beneficial direct and indirect impact on technopreneurial intention. The results imply that individuals who show interest in launching a new technology-based business have a strong sense of self-worth in their capacity to carry out the technological and entrepreneurial duties required are assured of their ability for success, and possess the inner drive to look for techno-innovations.

Keywords: Entrepreneurship, Entrepreneurial Venturing, Female students, Innate innovativeness, Need for achievement, Technopreneurial intention, Technopreneurial self-efficacy.

Introduction

In recent times, entrepreneurship is seen as a determinant of economic growth because, as the world's population increases, it significantly affects the expansion of economies, enterprises, and nations (Hisrich et al., 2017; Dutta and Meierrieks, 2021). After the fourth industrial revolution begins there is a high need of new technical advances available to the world that could be turned into profitable business endeavours (Hassoun et al., 2022). These ventures demand the integration of abilities from science and engineering, as well as commercial and entrepreneurial skills. The corporate world is changing rapidly as digital technologies such as the Internet of Things (IoT), 4D printing, and Artificial Intelligence (AI) advance (Abdul Rahim et al., 2020). Future venture makers now must follow and adapt the modernity, using digitalized systems for advancement. In this technological wave, entrepreneurs must also learn the approach of technology-based business, also known as technopreneurship, which engineers can use mostly (Koe, 2018; Zahra et al., 2023).

Historically, engineering fields have been dominated by men, but this has changed dramatically in recent years, with more women seeking engineering degrees and entering the tech workforce. Female engineering students and

technopreneurship make an intriguing mix with enormous potential for innovation and growth in the technology industry. Some previous researches have focused on the study with both male and female where female proportion is comparatively low (Salhieh & Al-Abdallat, 2022). The factors which specially effecting on the female's intention of digital venture creation is not addressed. So, the present study is mainly focusing on the intention of female engineering students.

Engineers' value creation roles serve as the foundation for many successful businesses. Now a day's many institutes are thinking to provide proper training to the engineers to make a start of techno-entrepreneurial programs (Yi and Duval-Couetil, 2018). Engineers need to be able to exploit, build, organize, and manage business ventures based on engineering concepts in order to be prepared to become engineering entrepreneurs, also known as technopreneurs. Furthermore, they must possess the creative attitude and problem-solving talents that are synonymous with the engineering sector. Innovation and entrepreneurship courses have become increasingly popular in universities around the world as the importance of fostering an entrepreneurial mindset and skill set becomes more recognized across various disciplines. The present study is attempting to search whether the success of developing technopreneurial intentions among female students is primarily based on their personal characteristics or not.

Technopreneurship is simply a form of entrepreneurship in technology-intensive context (Selvarani and Venusamy, 2015). It is the technique of combining technology with entrepreneurship (Bomani, 2021; Selvarani and Venusamy, 2015). People is considered a technopreneur if they can combine their administrative skills with technology knowledge (Yordanova et al., 2020). Technology-based entrepreneurship, or "technopreneurship," has an incredible potential in the corporate world (Masenya, 2021, Si et al., 2023). However, the term technopreneurship is quite new in the business world. People are not much aware with the term and even when the word is typed it shows as a misspelled word. But in the tide of technological revolution 'technopreneurship' is paving the way for entrepreneurship (Halim et al., 2023). The government regularly encourages business owners to adopt technology (Chen et al.; 2021) and become technopreneurs. Since the utilization of technology in the workspace has huge number of advantages (Abdulgani and Mantikayan, 2017). It can create an atmosphere that will make entrepreneurship more inclusive and improve innovation-driven entrepreneurship models (Elia, 2020). Entrepreneurship can't happen in a vacuum. It requires a good level of inclination towards starting something new. Studies show that higher entrepreneurial intention generates a good entrepreneur (Robert et al., 2020). The same idea has applied to the aspiration to become a technopreneur (Singhry, 2015). However, the existing research on technopreneurship and technopreneurial intention is still very limited (Koe et al., 2023; Abdulgani and Mantikayan, 2017). Because most studies on entrepreneurial intention concentrate on conventional entrepreneurship concepts. The need of literature has created a gap in knowledge of the elements influencing technopreneurial Intention or TECHINT. Like entrepreneurship, the process of technopreneurship begins with the Technopreneurial Intention (Lee and Wong, 2004) and students are found more enthusiastic about learning new things and creating innovative things. So, the foremost interest of the current study is to explore the TECHINT among the students. As some studies have already established that there are no gender (male and female) biases in entrepreneurial intention (Obembe et al., 2014; Washim et al, 2023). The researcher is interested to see the effect of personality traits (need for achievement and innate innovativeness) in the formation of TECHINT among female engineering students. To date, plenty of research work has been prepared on different categories of entrepreneurship as well as university students' intentions on entrepreneurship (Al-Jubari et al., 2019; Israr and Saleem, 2018; Mat et al., 2005). However, the topic TECHINT is overlooked by the researcher and it is considered as a new and unexplored topic. So, it is important to realize the main determinants that stimulate TECHINT.

It is a reality that developing TECHINT is not an easy job mainly among the females (Irene, 2019). This is because technopreneurs must be creative, imaginative, and proficient in technical work (Badran, 2007). Additionally, they must be able to provide technology-based products and services (Fowosire et al., 2017). Being a technopreneur requires strong personality traits towards management in addition to adequate technical expertise. As a result, research on TECHINT is still considered to be in its infancy and has not yet been thoroughly investigated. Specifically, till now, very a smaller number of researches has been done on TECHINT among female students. Furthermore, study on the psychological predictors (personality traits) that affect mainly females' TECHINT is very limited. The study is going to minimize the existing gap by developing five research hypothesis and a conceptual framework. The findings of this research would assist in the conception of the phenomenon of TECHINT among female students.

1. Theoretical Framework and Hypotheses Development

The term Technopreneurship first came to know to the people in 1983 (Qasim and Mahmood, 2022). Since the tide of the internet began to rise in April 2000, technopreneurship has started to get more attention (Hoque, 2017). Undoubtedly, the nation has invested a huge effort in the development of technopreneurship, but the creation of technology-based businesses still requires improvement. Particularly, there is still a need for more young adults to pursue careers as technopreneurs.

A study conducted on university students' of choosing a Technical-based venture or Technopreneurship as a career

has found quietly low (Koe et al., 2020). There is a tendency to give less importance to female in the business world. But for the development of the nation's economic structure, gender biases have to be strictly avoidable. According to Yurdanova et al. (2020), the characteristics that traditionally limit women's entrepreneurial ambitions in comparison to men do not have the same impact on the development of techno-entrepreneurial intentions. In India, research on Tech-entrepreneurship intention is not very common. This paper aims to examine the impact of need for achievement, innate innovativeness, and technopreneurial self-efficacy on technopreneurial intention among female engineering students. Figure 1 depicts the links between these structures, which will be further described in the next sections.

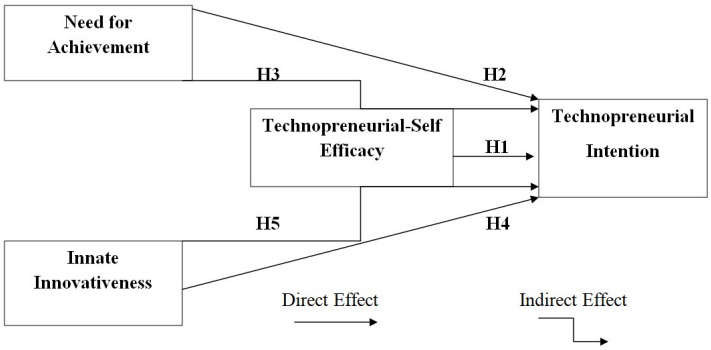

Figure 1: The conceptual model

2.1. Entrepreneurial Intention (EI) and Technopreneurial Intentions (TECHINT)

New organizations are formed on the principles of entrepreneurial intention (EI). The term 'Intention' describes the self-prediction of a person to engage in some activities (Fishbein and Ajzen, 2011; Ajzen and Madden, 1986). Because entrepreneurship evolves over time, having the ambition to start a new business could be the initial step. Entrepreneurial intention (EI) is seen as the first step in the long-term process of establishing an organisation (Crant, 1996). Entrepreneurial intention and technopreneurial intention are quite comparable. The objective of EI is to create a firm at any point of time in the future (Lee and Wong, 2004); starting a technology-based business is described as TECHINT (Purwati and Hamzah, 2022). To create the idea of TECHINT, the term "entrepreneurial" is frequently used in business contexts, whereas "technopreneur" is more specifically used to describe entrepreneurs who employ technology. This means that a person's intention to own a firm with a technology-focused focus is referred to as having a technopreneurial intention. Therefore, TECHINT is the mental state that directs a person's behaviours towards the creation and use of new technology venture concepts.

2.2. Technopreneurial self-efficacy (TSE)

According to Bandura (1977) self-efficacy is defined as "confidence in one's own ability to carry out the behaviours required to achieve a specific performance goal." People with high self-efficacy are more likely to engage in entrepreneurial activity (Bandura, 2012). In entrepreneurial framework the word Entrepreneurial self-efficacy (ESE) is used to discuss self-efficacy (De Nobel et al., 1999). ESE is the construct to evaluate person's confidence in their capacity to meet the numerous skill needs required to pursue new business opportunities (Pradyut, 2019). Many Studies demonstrated that ESE has a considerable mediating effect in the formation of EI (Chen et al., 1998; Zhao et al., 2005, Neneh, 2022). Thus, in the context of technopreneurial intention, the word technopreneurial self-efficacy (TSE) will be used to describe the belief in one's ability to successfully complete tasks in technopreneurship, combining confidence in both technical and business challenges (Al-Qadasi et al., 2023).

2.2.1. Technopreneurial Self-Efficacy (TSE) and Technopreneurial Intention (TECHINT)

To initiate a new technological enterprise, a technopreneur needs to have high self-efficacy (Utami, 2019; Loon Koe et al., 2021) as well as strong self-confidence in their abilities (Alamsyahrir and Ie, 2022). Individuals with strong TSE are more likely to engage in technopreneurial activities due to their confidence in their technical skills and entrepreneurial abilities (Soomro and Shah, 2021). A few numbers of earlier studies (Darmanto et al., 2022; Hoque et al., 2017) also reported that TSE is a good predictor of TECHINT. TECHINT can be predicted by individuals' conviction in their technical efficiency, i.e. TSE, which gives them potential to start a technology-based enterprise. This study looks into female students' intents to become technopreneurs. Improving TSE is essential for female engineering students to break down barriers to technopreneurship and boost participation, since this will create a more varied and skilled innovation ecosystem. The relationship between TSE and

TECHINT is examined through the development of a hypothesis, and it is anticipated that:

Hypothesis 1 (H1): TSE has a positive and significant impact on TECHINT (i.e., TSE → TECHINT).

2.3.1. Need for Achievement (n-Ach) and Technopreneurial Intention (TECHINT)

McClelland (1961) stated that one of the primary personality traits which influencing people's behavior is need for achievement (NACH). McClelland's theory claimed that people with high NACH have a strong mindset to success hence have more credible to engage in entrepreneurial activities (Karabulut, 2016; Anwar and Saleem, 2019. Few researches have shown that the NACH has a favorable and significant association with students' entrepreneurial goals (Gurol & Atsan, 2006; Che et al., 2015; Uysal et al., 2022). Study revealed that there is a positive correlation with NACH in developing EI among female students (Ahmad et al., 2016). There is a small but rising frame of research on the connection between female students' ambitions for technopreneurial activities and their need for success. The term "technopreneurship" describes business ventures in the technology industry, where new ideas and developments in technology are vital. The perception of technical opportunities by female students may be influenced by their need for achievement. Additionally, it is a powerful element that might encourage someone to develop technology-based businesses (Vodă and Florea, 2019). Thus, hypothesis 2 will be proposed as follows:

Hypothesis 2 (H2): Technopreneurial intention (TECHINT) is positively and significantly impacted by need for achievement (NACH) **(i.e., NACH → TECHINT).**

Entrepreneurial inclinations are influenced by the need for achievement where self-efficacy has plays as a mediating function (Naushad & Malik, 2018). Studies also demonstrated that NACH has a positive influence on female students EI through mediates with ESE (Liñán & Chen, 2009; Elia et al., 2020). People with high NACH might have greater faith in their capacity to use technology to make entrepreneurial activities (Liñán & Chen 2009). The present study initiates to show the connection of NACH with the development of TECHINT through the mediating TSE. Having high levels of both NACH and TSE may enhance the likelihood of developing strong intentions to pursue technopreneurship. So, there may be an interaction effect between the NACH and TSE on female students' technopreneurial intentions.

This study investigates the concept that Technopreneurial Self-Efficacy (TSE), a mediator between Technopreneurial Intention (TECHINT) and Need for Achievement (NACH), has a positive and significant indirect effect on TSE. Expanding upon this groundwork the next hypotheses is proposed as:

Hypothesis 3 (H3): Through Technopreneurial Self-Efficacy (TSE), Need for Achievement (NACH) positively and significantly influences Technopreneurial Intention (TECHINT), (i.e., **NACH → TSE → TECHINT**).

2.3.3. Innate Innovativeness (INNOV) and Technopreneurial Intention (TECHINT)

Zhang and Al-awlaqi (2023) define innovativeness as the highly competitive movement of an exceptional individual. It is the method of making new value out of understanding and purpose through creative thought. It entails using creative thinking to provide understanding and meaning a fresh perspective. It can be defined as an individual's strong desire and aspiration to achieve (Salhieh and Al-Abdallat, 2022). It has been identified as a crucial personality characteristic that drives entrepreneurial intention (Wang and Ahmed, 2004; Anwar and Saleem, 2019; Syed et al., 2020). Innovation is now a crucial factor in encouraging students to have entrepreneurial intentions (Al-Mamary and Alshallaqi, 2022). According to other studies (Huang et al., 2022; Nair, 2020; Brush, 2022) on female innovativeness, entrepreneurial intention is positively correlated with this trait. However, other academics also think that innovativeness has a big impact on university students' intention towards digital entrepreneurship (Alferaih, 2022). These characteristics may encourage someone to work in the field of creating new technological endeavours; As a result, the focus of this study is to explore how innate innovativeness influences the formation of technopreneurial intention by testing the following hypotheses:

Hypothesis 4 (H4): Innate Innovativeness (INNOV) has a direct positive and significant impact on Technopreneurial Intention (TECHINT) (**i.e. INNOV → TECHINT**).

Previous research work suggested that students with good innovative capacity are more efficient in entrepreneurial activities. Individuals with a strong credence in their competences to create new and innovative things make them confident and build their entrepreneurial self-efficacy. Innovativeness is an important criterion for developing TSE, which subsequently forms TECHINT (Salhieh and Al-Abdallat, 2022). To test the indirect impact of innate innovativeness on technopreneurial intentions through technopreneurial self-efficacy, the following hypothesis is proposed:

Hypothesis 5 (H5): Through Technopreneurial Self-efficacy (TSE), Innate Innovativeness (INNOV) has an indirect positive and significant impact on Technopreneurial Intention (TECHINT) (i.e., INNOV → TSE → TECHINT).

2. Research Methodology

3.1. Participants & Data Collection

As shown in Table 1, three Central Government Institutes of Arunachal Pradesh were chosen for the study to determine different personality qualities and their influence on female students' aspirations to pursue technopreneurial endeavours.

Table 1: Students list of the selected institute

Serial No.	Name of the institute	No. of female students
1.	Rajiv Gandhi University (RGU)	132
2.	North Eastern Regional Institute of Science & Technology (NERIST)	416
3.	National Institute of Technology (NIT)	154

Source: Authors' survey

Three central government institutes selected for the study includes Rajiv Gandhi University (RGU), North Eastern Regional Institute of Science & Technology (NERIST) and National Institute of Technology (NIT). These institutes selected for the study as students from various parts of the country from different communities are enrolled there. So, respondents' opinion would be more versatile types. The three universities have a total enrolment of 702 students. All selected participants were senior full-time students from six distinct engineering programs: electrical, electronics and communication, mechanical, civil, computer science, and agricultural. The targeted population's data was collected via stratified random sampling. A standardized questionnaire was utilized to record student replies. A total of 180 questionnaires (30 from each stream) were delivered for the investigation. All responses were gathered through physical visits to all institutes. The meaning of the questions was explained to the responders so that they understood the purpose correctly. Students were told that their responses would be kept confidential and utilised solely for academic and research purposes.

3.2 Research Instrument

To fulfil the research purpose, the researcher used all of the constructs from the entrepreneurial literature. A thorough literature study provided significant insights into the numerous measures that have been widely utilized in studies on personality traits and techno-entrepreneurship. These measurements were adapted from previously validated measures. A pilot test was carried out initially including 40 female engineering students. Since all of the study's constructs were taken from reputable sources, the researchers had previously acknowledged the validity and reliability of the scale. For clarification, the questionnaire's construct validity has been verified once again. Responses were recorded using a five-point Likert scale, with '1' representing' strongly disagree' and '5' representing' strongly agree'. The data collection instrument was divided into two sections. The first section focused on the respondents' demographic profiles, while the second section measured responses using 27 variables. These variables assessed higher education students' perceptions of their personality traits and their relationship to techno-entrepreneurial ambitions. The data collection instrument was written in English because it is a language that respondents from various Indian states understand. Appendix 1 includes the instrument used to record the responses.

The current research used questionnaires with 27 items to collect data from respondents (Table 2).

Table 2: Sources of measurement items

	Construct	Scales	Items	Sample item
Exogenous Variable	Need for Achievement	**NACH scale** (Cassidy & Lynn, 1989; Kristiansen & Indarti, 2004)	10	"I will do very well in difficult tasks relating to my study and work."
	Innate Innovativeness	**INNOV scales** (Goldsmith & Hofacker, 1991; Gabriel & Moretti, 2022)	6	"I am the one with the most technological novelties among my

				friends."
Endogenous Variable	Technopreneurial Intentions	**TECHINT scale** (Liñán, & Chen, 2009; Yurtkoru et al., 2014)	6	"I am ready to do anything to be a technopreneur."
Mediating Variable	Technopreneurial Self-efficacy	**TSE scale** (Doanh & Bernat, 2019)	5	"I show great aptitude for creativity and innovation."
Total Items			27	

3.3 Data Screening and Analysis

To ensure that the information gathered was accurate and appropriate for further analysis. The missing values need to be looked at first. A total of 180 students who have finished an innovation and entrepreneurship course received questionnaires. Out of 180 surveys, only 173 were answered accurately. After that, the gathered data was scrutinized to make sure it was error-free and appropriate for additional study. After removing misbehaviour by respondents and missing responses, only 160 surveys were found to be suitable for additional investigation. The sample size of 160 meets this requirement. Less than 10% of the responses were found to have missing values in a few accounts; in particular, 7.5% of the responses lacked data (Roy et al., 2017; Mueller & Hancock, 2008). Furthermore, in SPSS AMOS (version 26), "regression imputation" was used to impute missing data. Table 3 displays the replies from 160 students in all programs that made up the complete data set.

Table 3: Description of the sample

		Count	Percentage (%)
Engineering Stream:	Electrical Engineering (EE)	29	18.13%
	Electronics and Communication Engineering (ECE)	28	17.50%
	Mechanical Engineering (ME)	25	15.63%
	Civil Engineering (CE)	26	16.25%
	Computer Science Engineering (CSE)	28	17.50%
	Agricultural Engineering (AE)	24	15.00%
Total		**160**	

Sample's Demographic Profile (N= 160)

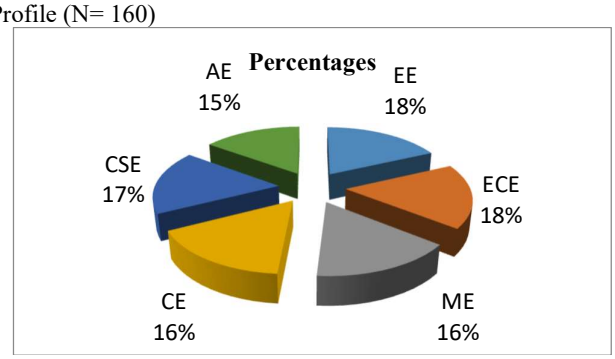

Figure 2: Sample distribution

Sample distribution of the different stream students are shown in the figure 2.

The normality of the gathered data was examined since a normally distributed set of data is a prerequisite for structural equation modelling, or SEM. To ascertain if the responses to the variables were normally distributed, skewness and kurtosis statistics were employed (Roy et al., 2017). The collected data met the accepted limits for skewness and kurtosis, skewness and kurtosis ranges from -2 to +2 and -7 to +7 respectively (Hair et al., 2010; Byrne, 2013). There was a chance of common method bias (CMB) because all of the data for the independent and dependent variables was gathered from the same respondents at the same time (Chang et al., 2020). In order to examine the CMB to determine if a single factor might account for the noteworthy correlation between the dependent and independent variables, Harman's single-factor test was employed (Podsakoff et al., 2003). The results showed that a single-factor structure explained 29.23% of the overall variation, while not meeting the 50% criterion. As a result, CMB was not a problem in this study. According to Anderson and Gerbin's (1988) guidelines, values of latent constructs were evaluated using exploratory factor analysis using SPSS 24.0. Sample adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) test, and a KMO result of 0.809 suggested an

appropriate sample size for factor analysis. Additionally, the results of Barlett's sphericity test showed sufficient inter-correlation between the variables, with a significant result (p =.001).

3. Results

The results of the descriptive analysis and the hypotheses looked into in this study are highlighted in this part. Table 3 presents a descriptive analysis of the demographic data provided by the respondents. The survey included 160 undergraduate and postgraduate female students those who are enrolled in different engineering streams. The participants' ages ranged from 17 to 35. According to the study, 92 (57.50%) of respondents were between the ages of 17 and 22, 60 (37.50%) were between the ages of 23 and 28, and 8 (5.0%) were between the ages of 29 and 35. The age distribution makes sense given that 17 or 18 are the minimum age required to enroll in university. 75.625% of the respondents were undergraduate students, whereas 14.375% were postgraduate students. According to the residence status of the students', 56 (35.00%) belonged to the rural region, 50 (31.25%) to the semi-urban area, and 54 (33.75%) to the urban area. Based on the current survey, 152 (95.00%) respondents are unmarried, 8 (5.00%) are married, and the number of separated respondents is zero. According to the most current survey, 27 (16.88%) of the family's members had a low economic background, 121 (75.62%) had a medium economic level, and 12 (7.5%) reported a high economic position. Furthermore, the majority of students, 106 (66.25%), stated that at least one member of their family owns or runs a business, while only 54 (33.75%) indicated otherwise. The first part of the questionnaire provided information about the students' demographics.

Table 3: Respondents' demographic profile

Variable	Level	Frequency	Percentages (%)
Age	17-22	92	57.5
	23-28	60	37.5
	29-35	8	5.00
Degree Program	Undergraduate	121	75.625
	Postgraduate	39	14.375
Residence	Rural	56	35.00
	Semi-Urban	50	31.25
	Urban	54	33.75
Marital status	Unmarried	152	95.00
	Married	8	5.00
	Separated	0	0
Family economic status	Low	27	16.88
	High	12	7.5
Family ownership of business?	Yes	106	66.25
	No	54	33.75

Source: Author's survey

4.1 Measurement Model Analyses

Before applying structural equation modelling (SEM), the measurement model should be reviewed to verify scale validity and reliability (Hoque et al., 2017). The construct reliability was evaluated using composite reliability (CR) and Cronbach's alpha (α). Cronbach's alpha values of 0.7 or higher, as well as composite reliability ratings of 0.6 or higher, are regarded as excellent by Gefen et al. (2000) and Hair et al. (2015). Cronbach's alpha and composite reliability ranges in this study were 0.838-0.928 and 0.837-0.929, respectively. Consequently, every construct and dimension were considered suitable (Table 4). But loadings for some components were discovered to be less than the 0.5 minimum allowed value (Kline, 2023). As a result, the following three construct NACH_9, INNOV_6, and TSE_3 was eliminated.

All components' convergent validity was determined using standardised factor loading and average variance extracted (AVE) procedures. The AVE values for all four constructs attained a minimum of 0.50 (Hair et al., 2015), and the standardised factor loadings of the other 24 items were greater than 0.50 (Kline, 2023), indicating appropriate convergence validity. As a result, the latent constructs TECHINT, NACH, INNOV, and TSE demonstrated construct reliability, internal reliability, and convergent validity. To evaluate the measurement model, AMOS (version 26) was used for confirmatory factor analysis (CFA). The factor loadings for each item were evaluated as part of the CFA. Table 4 displays the item factor loading values as well as the Cronbach's alpha, AVE, and CR values.

Table 4: Factor Loading, CR, AVE and Cronbach's α

Construct	Items	Factor Loading	CR	AVE	Cronbach's α
Technopreneurial Intention	TECHINT_1	0.785			

	TECHINT_2	0.848	0.905	0.613	0.903
	TECHINT_3	0.759			
	TECHINT_4	0.817			
	TECHINT_5	0.756			
	TECHINT_6	0.729			
Need for Achievement	NACH_1	0.832	0.929	0.607	0.928
	NACH_2	0.842			
	NACH_3	0.778			
	NACH_4	0.662			
	NACH_5	0.785			
	NACH_6	0.853			
	NACH_7	0.769			
	NACH_8	0.765			
	NACH_10	0.864			
Innate Innovativeness	INNOV_1	0.805	0.913	0.625	0.912
	INNOV_2	0.812			
	INNOV_3	0.856			
	INNOV_4	0.843			
	INNOV_5	0.802			
Technopreneurial Self-efficacy	TSE_1	0.746	0.837	0.562	0.838
	TSE_2	0.733			
	TSE_4	0.753			
	TSE_5	0.765			

The Fornell and Larcker (1981) criteria demonstrate discriminant validity when there is a small correlation between the constructs. The discriminant validity index, which is helpful for assessing discriminant validity, is summarised in Table 5. The correlations between the constructions are shown by the other values, while the diagonal values show the square root of the AVE for each construct. When the diagonal values of a construct are bigger than the values in the corresponding rows and columns, the construct is said to have discriminant validity (Pallister & Foxall, 1998). Table 5 demonstrates that the diagonal values are greater than the values in the corresponding rows, supporting the discriminant validity of the model.

Table 5: Discriminant validity

Constructs	TECHINT	NACH	INNOV	TSE
TECHINT	***0.783***			
NACH	0.71	***0.779***		
INNOV	0.76	0.732	***0.791***	
TSE	0.652	0.632	0.633	***0.75***

Note: The upper column reflects the square root of the average variance extracted, while the lower cell represents the correlation between constructs.

4.2 Structural Model Analysis

A structural equation model (SEM) with a covariance basis was created using the AMOS software. Many variable interactions, which can be directly observable or unobserved, are modelled using structural equations (Zander et al. 2018). The proposed methodology was subsequently re-specified using the theoretical explanation to assess modification indices (Anderson & Gerbing, 1988). The final CFA findings showed a good model fit using the following indices: Tucker-Lewis's index (TLI) = 0.931, Root mean square error of approximation (RMSEA) = 0.086, Goodness of fit index (GFI) = 0.914, Comparative fit index (CFI) = 0.940, and Maximum discrepancy divided by degrees of freedom (CMIN/DF) = 2.47. Each number was within the widely accepted range that matched it. Table 6 presents the values found for the model under examination along with the recommended values for each index (Pallister & Foxall, 1998; Zander, 2018), indicating that the model utilised is appropriate.

Table 6: Model fit indices

Index	Obtained Values	Suggested Values
CMIN/Df	2.47	≤ 3
CFI	0.940	≥ 0.90
GFI	0.953	≥ 0.90

TLI	0.931	≥ 0.90
RMSEA	0.086	<0.10

4.3. Hypotheses Testing

Based on the stated hypotheses, a path model was created to evaluate the degree of connection between two constructs. Next, the beta weight (β) of the path coefficient was calculated.

Table 7: Hypotheses testing results

Hypothesis	B	t	P	
H1 (TSE → TECHINT)	0.225	2.44	0.001	**Accepted**
H2 (NACH →TECHINT)	0.452	5.66	0.001	**Accepted**
H4 (INNOV → TECHINT)	0.237	2.648	**<0.001**	**Accepted**

A standardised regression coefficient of **0.225** supports the hypothesis (H1), according to which technopreneurial self-efficacy (TSE) positively and significantly influences technopreneurial intentions (TECHINT).

This result supports the hypothesis that respondents' TECHINT can be predicted by higher TSE. Furthermore, the hypothesis (H2) that the need for achievement has a direct and considerable impact on technical entrepreneurial inclinations is supported by a standardised regression coefficient of **0.452**. This indicates that female engineering students are more likely to participate in techno-entrepreneurial activities if they have a strong drive for success.

Additionally, Hypothesis (H3) is also supported, which looked at how the need for achievement indirectly affects TECHINT through TSE. That is to say, the findings demonstrate that technopreneurial self-efficacy, which is a function of the NACH, influences technopreneurial intents in both direct and indirect ways. The fact that an engineering student who has a strong need for achievement is more likely to grow a strong sense of self-efficacy as a technopreneur and, eventually, develop the intention towards technopreneurship.
A standardised regression coefficient of **0.237** supported hypothesis (H4), which looked at how technopreneurial aspirations were impacted by innate innovativeness (INNOV). This lends credence to the idea that students are more likely to participate in entrepreneurial endeavours when they are receptive to novel technical ideas. Support was also shown for Hypothesis (H5), which investigated the indirect impact of INNOV on TECHINT through TSE. Additionally, the results show that the drive for performance has a greater impact than the innate inventiveness of engineering students, as indicated by the standardised regression coefficient. This implies that engineering students' aspirations to become entrepreneurs are strengthened by the technology-focused education they get.

4. Discussion

This study looked at what motivates female engineering students to launch technology-based businesses. According to the findings technopreneurial self-efficacy is a strong predictor of technopreneurial intents. This is consistent with earlier studies on engineering students' aspirations for entrepreneurship (S Yi & N Duval-Couetil, 2018; Gilmartin et al., 2019). Additionally, the study looked into how the relationship between the need for achievement and technopreneurial intention is mediated by technopreneurial self-efficacy.

Individuals with a strong desire to succeed are more likely to generate high levels of technopreneurial self-efficacy because they actively seek opportunities to harness their skills and pursue their entrepreneurial skills. This increased self-belief, in turn, reinforces their desire to pursue technopreneurship by providing the confidence and determination required to overcome obstacles and capitalise on possibilities. According to the findings, students with a high level of intuitive (innate) innovativeness are more likely to wish to start a new technology-based business. The data also demonstrated that natural innovativeness has a direct and indirect effect on technopreneurial intents through technopreneurship self-efficacy, as previously hypothesised.

This shows that people with strong sense of innate innovativeness might pursue high self-confidence and consequently develop technopreneurial intentions. This finding emphasises the importance of studying the psychological aspects that influence entrepreneurial behaviour, especially in specialised industries like engineering, where creativity and problem-solving are critical. Recognising the importance of need for achievement educators and policymakers can design interventions and support mechanisms that effectively nurture entrepreneurial aspirations among engineering students.

5. Implications

The findings of this study have a variety of consequences for technopreneurship research and practice. The considerable influence of need for achievement shows that people who have a strong need for achievement are often highly motivated to succeed.

This drive can push them to set ambitious goals for their technopreneurial ventures and work tirelessly to accomplish them. The need for achievement can fuel innovative thinking and problem-solving skills. Technopreneurs who are driven by a desire to achieve may constantly seek new and creative ways to address market needs or challenges in their industry.

The results of this study demonstrated the critical role that high innovation capacity plays in developing technopreneurs poised to engage new technology-based businesses by showing that students with a strong need for achievement acquired strong technopreneurial self-efficacy and ambitions. This emphasises how present engineering curricula need to be revised in order to improve and incorporate entrepreneurial components into a variety of courses. According to this study, pupils who had a high demand for success developed. Furthermore, the study shows that students who possessed high levels of intrinsic creativity were motivated to start technology-based businesses because they had a particular interest in cutting-edge breakthroughs in technology. Subsequent studies may investigate the impact of additional personality characteristics on the ambitions of technopreneurs.

6. Limitation and Direction for Future Research

This study, like many others, has clear flaws that need to be addressed in future research. The study was initially done in Arunachal Pradesh's central government institutes. All of these institutes are located in small towns, which may restrict the findings' generalizability to broader communities. Consequently, a broader range of institutions from across the country must be chosen, ensuring that both urban and cosmopolitan universities are represented in the study. The inclusion of a greater number of universities from various locations would undoubtedly improve the external validity of this study.

Secondly, the study was consisted only the female students who pursuing under-graduate, post-graduate engineering courses. So, the study did not cover the whole population hence the likelihood of limited generalization to other populations. Finally, the study can only touch two personality traits (need for achievement and innate innovativeness) through the mediator technopreneurial self-efficacy. Future studies should examine whether the influencing process involves more than one mediating variable or how other variables moderate the mediating variables.

7. Conclusion

Technopreneurship, which allows people to start technology-based businesses, is regarded as an essential component of the modern digital economy. Therefore, it's critical to comprehend the elements influencing students' aspirations to become technopreneurs who can launch new technology-based businesses. This study indicated how three elements can drive students to have technopreneurial intentions: (1) the need for achievement, which involves risk; persons with a high need for achievement may be more prepared to take calculated risks in order to attain their goals. They are frequently undeterred by the fear of failure and are willing to step outside of their comfort zones to pursue opportunities; (2) a high belief in one's capacity to carry out technology and entrepreneurial duties is known as technopreneurial self-efficacy; (3) Innate innovativeness is the drive to look for new and innovative technological developments. Additionally, the study revealed that, in addition to its direct impact, the drive for achievement indirectly promoted the development of technopreneurial aspirations by increasing students' technological self-efficacy.

This implies that the development of future technopreneurs is significantly influenced by their highly ambitious mindset. **In conclusion**, the study can fill the research gap in the intersection of personality traits, technopreneurial self-efficacy, and female technopreneurial intention which discover a new opportunity for scholars to move on the understanding of gender dynamics in technology entrepreneurship and inform efforts to promote gender-inclusive entrepreneurship ecosystems.

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