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Using partial least squares structural equation modeling (PLS-SEM) to assess the effects of entrepreneurial education on engineering students's entrepreneurial intention

Cuong Quoc Nguyen[1]*, Anh Minh Tu Nguyen[2] and Long Ba Le[3]

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*Corresponding author: Cuong Quoc Nguyen, Faculty of Commerce and Tourism, Industrial University of Ho Chi Minh City, Vietnam
E-mail: nguyenquoccuong@iuh.edu.vn

Reviewing editor:
May Cheng, Chair Professor of Teacher Education, Education University of Hong Kong, Hong Kong

Additional information is available at the end of the article

Abstract: This study aims to assess the impacts of three components from Theory of Planned Behaviour (TPB) on Entrepreneurial intention and analyze the mediating effects of these three components in the relationship between Entrepreneurial education and Entrepreneurial intention and in the relationship between Self-Efficacy and Entrepreneurial intention among engineering students. Data were collected via a structured questionnaire from engineering students at Industrial University of Ho Chi Minh City in Vietnam. The methodology employed Structural Equation Modelling Partial Least Squares (SEM-PLS) using SmartPLS (version 3.3.3) to assess the relationship among variables. Findings confirm the directly positive relationship between Attitude toward entrepreneurship, Perceived behaviour control and Subjective norms on engineering student's entrepreneurial intention. These three components of TPB mediate the relationship between Entrepreneurial education, Self-Efficacy and engineering student's entrepreneurial intention. This study contributes toward the understanding of engineering student's entrepreneurial intention in Vietnam as an emerging market in Asia. The mediating effects of three components of TPB have been systematically investigated and the indirect roles of Entrepreneurial education and Self-Efficacy have been validated by applying employed Structural Equation Modelling Partial Least Squares (SEM-PLS). Managerial implications are discussed to promote engineering student's entrepreneurial intention in Vietnam. Higher education leaders and policymakers can utilise the findings

ABOUT THE AUTHOR

Cuong Quoc Nguyen

Dr. Cuong Quoc Nguyen is Vice Dean of Faculty of Commerce and Toursim of Industrial University of Ho Chi Minh City in Vietnam. Dr. Cuong Nguyen received Bachelor of Business from La Trobe University (Australia), Master of Management from University of Wollongong (Australia) and Ph.D degree in Management Science from the University Paris 1 Panthéon-Sorbonne (France). Dr. Cuong Nguyen is member and reviewer of European Academy of Management (EURAM); editorial member of SN Business & Economics (Springer) and his research fields include entrepreneurship, marketing, management and tourism. His ORCID account is: https://orcid.org/0000-0001-7842-0564.

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to construct the initiatives of entrepreneurship development and their implementation for engineering students.

Subjects: Entrepreneurship and Small Business Management; Entrepreneurship; Higher Education

Keywords: Entrepreneurial intentions; attitude towards entrepreneurship; perceived behavioural control; Subjective norm; self-efficacy; entrepreneurship education; engineering students; PLS-SEM

1. Introduction

Entrepreneurship has become an enormous movement worldwide. Entrepreneurship has been recognised as a critical solution to creating jobs for young people, promoting economic growth, and creating a propensity for society (Schumpeter and Nichol, 1934). Boubker et al. (2021) insist that entrepreneurship is one of the critical factors determining economic development. However, Vietnamese students do not pay much attention to becoming entrepreneurs. According to the Vietnam Chamber of Commerce and Industry (VCCI) report, nearly 66% of Vietnamese students are not concerned about entrepreneurship. The number of students applying and participating in entrepreneurial activities is only 33.4%, and the actual annual participation in start-up programs organized by VCCI is only 0.016%. According to Thuy and Truc (2020), students are often afraid of failure, feel insecure, and want to find a job with a decent salary instead of starting a business. Unfortunately, many students still lack confidence and are confused when dealing with complicated issues in the start-up process. Kusumojanto et al. (2021) argue that entrepreneurial intention plays a central role in stimulating the growth of entrepreneurs. Students' entrepreneurial intentions can be nurtured in higher educational environments like universities and colleges. According to Jones and English (2004), entrepreneurship education is a process that teaches students how to recognize commercially viable opportunities and how create vision and identity and acquire knowledge and skills so that they can act on them. Huang et al. (2021) confirm that entrepreneurship education aids in developing entrepreneurial knowledge and skills to create opportunities in the business environment. Besides, the entrepreneurial policy is especially essential for developing entrepreneurial intention after undergoing entrepreneurship education. However, few studies investigated the role of entrepreneurship education in students' entrepreneurial intentions. These studies produced controversial results, which call for the attention of researchers for further investigations (Shah et al., 2020). Hence, the main objective of this study is to assess the effects of entrepreneurial education on engineering students' entrepreneurial intention in Viet Nam. Policymakers and higher education leaders can use the findings of this study to promote the effects of entrepreneurial education among engineering students in Viet Nam and other emerging markets in Southeast Asia.

2. Literature review and hypotheses

2.1. Literature review

2.1.1. Entrepreneurial education

Fayolle and Gailly (2008) define entrepreneurship education as any pedagogical program or education process for entrepreneurial attitudes and skills. Piperopoulos and Dimov (2015) argue that entrepreneurship education can be classified into education about entrepreneurship, education for entrepreneurship, and education in entrepreneurship. Nabi et al. (2017) state that entrepreneurial education aims to help students improve the probability of their business success and enhance the careers they can choose. The significance of entrepreneurship education has gained increasing attention from scholars worldwide (Nowiński et al., 2019). Gheorghiu et al. (2021) insist the role that innovative universities can play in stimulating entrepreneurial initiative in a healthy business environment, as an engine of sustainable economic development.Wang et al. (2022) argue that entrepreneurship in higher education increasingly values entrepreneurial creativity as

a key driver to enhance the innovation ability of university students in China. In the Vietnamese context, Thuy and Truc (2020) believe that entrepreneurship education positively affects Vietnamese students' entrepreneurial intention. However, Maheshwari and Kha (2021) confirm that entrepreneurial education does not directly impact entrepreneurial intentions. However, educational support does have a significant positive effect on the Theory of Planned Behaviour components and self-efficacy, which further affects entrepreneurial intentions. Hence, Vietnamese universities need to develop entrepreneurial courses that can help develop the skills for starting new ventures.

2.1.2. Entrepreneurial intentions

Entrepreneurial intentions are popularly used to predict entrepreneurial behaviour (Ajzen, 1991). Ajzen (1991) also describes that the decision to start a new venture had been planned for some time, and thus the intentions to start a business have already been established. Rosli and Sidek (2013) state that entrepreneurial intentions play an essential role in the emergence of entrepreneurial activities and the ability to become an entrepreneur. Entrepreneurial intention is the first stage in business development that requires risk taking and creativity (Lee & Wong, 2004). Meanwhile, Kolvereid (1996) argues that entrepreneurial intentions aim to create a business, which is the necessary condition for implementing entrepreneurial behaviours (Alain & Gailly, 2006; Yang, 2013). Entrepreneurial intention is a person's sense of career choice derived from personal factors, social contexts, and professional attitudes. Entrepreneurs are usually described as being independent, autonomous, creative, innovative, and risk-taking to create new value for their organization (Shi et al., 2020; Tkachev & Kolvereid, 1999).

2.1.3. The entrepreneurial event theory (SEE)

The Entrepreneurial Event Theory (SEE) is constructed by Shapero and Sokol (1982), and considers the creation of a business as the result of the interaction between contextual factors through the influence they have on the individual's perception. Shapero and Sokol (1982) pointed out the significance of perception in predicting the entrepreneurial intentions. The three components of SEE include Perceived desirability which refers to the extent to which an individual feels attracted to a particular behaviour which is becoming an entrepreneur. Propensity to act refers to a person's willingness to act upon a decision. Perceived feasibility is defined as how people believe themselves capable of performing certain behaviours. The Entrepreneurial Event Theory forms the basis for investigating other factors that influence entrepreneurial intentions (Prathap & Sreelakshmi, 2020).

2.1.4. Theory of planned behavior (TPB)

The Theory of Planned Behavior (TPB) model is most commonly used to predict entrepreneurial intentions (Liñán & Chen, 2009). Moriano et al. (2012) suggests that researchers can employ the Theory of Planned Behavior (TPB) to predict entrepreneurial intentions. Yang (2013) confirms the validity of the Theory of Planned Behavior to predict entrepreneurial intentions. In the Vietnamese context, Nguyen (2018) confirms the validity of TPB in describing the entrepreneurial intention of business students. The practical experience of small business owners and how they perceives their problems and difficulties during start-up process (Nguyen, 2018). Entrepreneurial intention is confirmed to have three conceptually determinants that include attitudes toward entrepreneurship, social norms, and perceived behavioural control (Ajzen et al., 2011; Liñán & Chen, 2009; Shi et al., 2020)

2.2. Hypotheses

2.2.1. Attitudes towards entrepreneurship (ATT)

Many researchers have found a positive relationship between attitude and entrepreneurial intentions (Entrialgo & Iglesias, 2016; Heydari et al., 2020; Lingappa et al., 2020; Shah et al., 2020; Terán-Pérez et al., 2021). Attitude towards a behaviour refers to how a person positively or negatively evaluates the behaviour in question (Ajzen, 1991). Attitude toward entrepreneurship is defined as the difference between a person's perceived desire to do his or her work and an

organized employment" (Souitaris et al., 2007). According to Liñán and Chen (2009), attitude towards entrepreneurship is the degree to which a person values entrepreneurship positively or negatively. Entrepreneurship attitude is confirmed to have a positive impact entrepreneurial intentions, especially among students (Nguyen, 2021). Phong et al. (2020) emphasize that entrepreneurship attitude and proactive personality significantly impact entrepreneurship. According to Dinh and Sen (2022), students' attitudes toward entrepreneurship and entrepreneurial intentions are positively related. Therefore, the authors propose the first hypothesis as follows:

Hypothesis H1: Attitude towards entrepreneurship positively impacts engineering students' entrepreneurship intentions.

2.2.2. Perceived behavioural control (PBC)

Perceived behavioural control refer to a person's perception of how easy or difficult it is to perform a behaviour (Ajzen, 1991). Perceived behavioural control refers to the degree of control over the performance of the behaviour rather than the outcome of the behaviour (Ajzen, 2002). Perceived behavioural control describes students' perception about their willingness to act on the necessary resources, knowledge, and opportunities to achieve their entrepreneurial goals. Therefore, many scholars confirm a positive relationship between Perceived behavioural control and entrepreneurial intentions (Autio, E et al., 2001; Kolvereid, 1996; Krueger et al., 2000; Nguyen, 2015; Souitaris et al., 2007). In Vietnamese higher education environment, Perceived behavioural control positively impacts the entrepreneurial intentions of Vietnamese students (Dinh & Sen, 2022; Thuy & Truc, 2020). However, Phong et al. (2020) argue that Perceived behavioural control has no impact on students' entrepreneurial intentions in Viet Nam. Based on the different viewpoints of previous studies, we propose the second hypothesis as follows:

Hypothesis H2: Perceived behavioural control positively impacts engineering students' entrepreneurship intentions.

2.2.3. Subjective norms (SN)

Subjective norms are validated to have a positive association with entrepreneurial intentions (Dinh & Sen, 2022; Entrialgo & Iglesias, 2016; Heydari et al., 2020; Nguyen, 2017; Shah et al., 2020). Phong et al. (2020) confirm that attitudes and social norms towards entrepreneurship and proactive personality significantly impact entrepreneurship. In Vietnamese higher education conext, Thuy and Truc (2020) also confirm that Subjective norms positively impact students' entrepreneurial intentions. However, Dinh and Sen (2022) indicate that Subjective norms have no impact on students' entrepreneurial intentions. Following other viewpoints of the above publications, the authors propose a third hypothesis as follows:

2.3. Hypothesis H3: Subjective norm positively impacts engineering students' entrepreneurship intentions

2.3.1. Seft-efficacy (S-E)

Self-efficacy concerns the individual perception of one's own abilities to perform a given activity. Huitt (2011) explains the concept of capacity as the second type of knowledge, which includes "know-what" and "know-how". Wąsowska (2016) show that entrepreneurial self-efficacy is the most crucial factor in predicting entrepreneurial intentions among students in Poland. Nowiński et al. (2019) confirm that self-efficacy strengthens entrepreneurial intentions effectively only in combination with other factors. Peschl et al. (2021) state that entrepreneurial abilities are necessary to encourage entrepreneurial activities to be implemented. Many scholars confirm that entrepreneurial self-efficacy is one of the main determinants explaining entrepreneurial intentions (Gill et al., 2021; Liao et al., 2022). Moreover, Gonzalez-Moreno et al. (2019) confirm that entrepreneurship education is essential in enhancing students' ability to carry out entrepreneurial activities when starting a business. Students will be more confident in choosing an entrepreneurial career once exposed to entrepreneurship education earlier. Hence, entrepreneurship education is

referred to as developing students' entrepreneurial abilities after attending an entrepreneurship learning. In the Vietnamese context, Hoang et al. (2020) reveal that entrepreneurship education positively affects entrepreneurial intentions, and learning orientation and self-efficacy mediate this relationship. Therefore, the authors propose the following hypothesis:

Hypothesis H4a: Attitude toward entrepreneurship mediates the relationship between Self-efficacy and entrepreneurial intentions.

Hypothesis H4b: Perceived behavioural control mediates the relationship between Self-efficacy and entrepreneurial intentions.

Hypothesis H4c: Subjective norms mediate the relationship between Self-efficacy and entrepreneurial intentions.

2.3.2. Entrepreneurship education (EE)

Kolvereid (1996) confirm that students who had studied entrepreneurship were more interested in becoming entrepreneurs and took entrepreneurial actions to start a new business than other students. Hence, entrepreneurship education can and should be provided to engineering students to help them become entrepreneurs. Moreover, Bae et al. (2014) argue that entrepreneurial education positively impacts entrepreneurial attitudes and skills (Bae et al., 2014). Current researchers tend to evaluate the effectiveness of entrepreneurship education based on entrepreneurial intentions rather than actual entrepreneurial behaviour. Besides, research attention of entrepreneurship education started to change from "entrepreneurship establishment" to "entrepreneurship attitude" (Mwasalwiba, 2010). Hattab (2014) showed that entrepreneurship education could improve entrepreneurial intentions through personal attitudes and perceptions. Thuy and Truc (2020) believe that entrepreneurship education positively impacts students' entrepreneurial intentions. The research findings of Maheshwari and Kha (2021) in Vietnam show that entrepreneurship education does not directly impact entrepreneurial intentions but has an indirect positive impact on the three components of the entrepreneurial theory of perceived behaviour and self-confidence as a mediator. Dieu et al. (2022) confirm that entrepreneurship education service quality had a positive and statistically significant effect on entrepreneurial intention among Vietnamese students.

Therefore, this fourth hypothesis is divided into three smaller hypotheses, Hypothesis H4a, Hypothesis H4b, and Hypothesis H4c:

Hypothesis H5a: Attitude toward entrepreneurship mediates the relationship between Entrepreneurship education and entrepreneurial intentions.

Hypothesis H5b: Perceived behavioural control has a mediating impact on the relationship between Entrepreneurship education and entrepreneurial intentions.

Hypothesis H5c: Subjective norms mediate the relationship between Entrepreneurship education and entrepreneurial intentions.

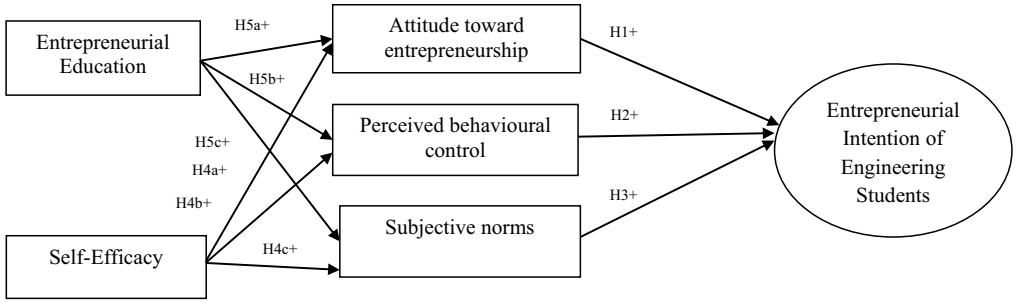
From the above research overview, the proposed research model (Figure 1) are presented as below:

3. Method

3.1. Sample and data collection

This study uses a quantitative research approach that includes two phases. The first phase is the pilot test of the research instruments adopted from previous studies (Ajzen, 2002; Hasan et al., 2017; Hoang et al., 2020; Maheshwari & Kha, 2021). In this phase, the authors conducted a pilot study with 60 students from the 06 engineering faculties of IUH, including the Faculty of

Figure 1. The proposed research model.



Information Technology, Faculty of Civil Engineering, Faculty of Electronics Technology, Faculty of Electrical Engineering Technology, Faculty of Mechanical Engineering and Faculty of Automation Engineering Technology. The second phase is to conduct the official research in which data were collected from final-year students from 06 engineering faculties of IUH. The raw data was filtered to exclude the missing responses. Six hundred questionnaires were given and 582 questionnaires were returned. Eventually, the response rate was 97%. After removing omitting data, only 518 valid responses are used for the data analysis. Data collection was implimented through an online survey via Google Form. The study employs a non-probability random sampling method with a sample size of 518 engineering students at IUH. All construct is measured on a Likert 5 scale which ascending order of 01 (strongly disagree), 02 (strongly disagree), 03 (neutral), 04 (strongly agree), and 05 (strongly agree).

3.2. Instruments development data analysis

Instrument items are adopted from the previous study, such as three components from the Theory of Planned Behavior (Liñán & Chen, 2009); Entrepreneurial education (Hasan et al., 2017), Self-efficacy (Maheshwari & Kha, 2021) and Entrepreneurial intention (Liñán & Chen, 2009). The authors employed Structural Equation Modelling Partial Least Squares (SEM-PLS) using SmartPlS (version 3.3.3) to assess the relationship among variables. Bootstrapping function (1000 resample) was used to assess the significance level of the path. The SEM-PLS in this study followed Hair et al. (2017) which includes: evaluation of the measurement model (outer model); (2) evaluation of the structural model (inner model), (3) goodness-of-fit estimation (GoF), and (4) hypothesis testing.

4. Results

4.1. Demographic profile of the respondents

The demographic profile of respondents is presented in Table 1. Overall, 86.9% of the respondents are male, and only 13.1% are Female. Respondents come from 06 engineering faculties, ranging from 13.4% to 19.3%. Only 24.8% of students have prior experience in business, and 79.1% of respondents do not come from family business backgrounds. Remarkably, 83.7% of respondents do not have any prior experience in entrepreneurial education in higher education environments.

4.2. Measurement model assessment

PLS-SEM was used to analyze the measurement model of this research. The reliability of factor loading (Cronbach's alpha), composite reliability, average variance extracted, convergent validity and discriminant validity were examined, and the output is shown in Table 2. Hair et al. (2017) suggest that the construct scores greater than 0.7 should be considered reliable. In this study, all of the 06 variables have Cronbach's alpha scores above 0.8, so all the constructs meet the reliability criterion. Average Variance Extracted (AVE) is a metric for determining convergent validity (Hair et al., 2019). Adequate convergent validity is assured as the AVE value is at least 0.5 (Fornell & Larcker, 1981). All the variables in this study have AVE values above 0.5, indicating adequate convergent validity. Discriminant validity is measured by applying Fornell–Larcker Criterion (Fornell & Larcker, 1981). The square root of the AVEs should be higher than the

Table 1. The demographic profile of respondents (n = 518)

Profile of respondents	Response	(%)
Gender	Male	86.9
	Female	13.1
Education Background	Faculty of Information Technology	19
	Faculty of Civil Engineering	19.3
	Faculty of Electronics Technology	19
	Faculty of Electrical Engineering Technology	15.3
	Faculty of Mechanical Engineering	13.7
	Faculty of Automation Engineering Technology	13.4
Prior experience in business	Yes	24.8
	No	75.2
Family businesses background	Yes	20.1
	No	79.1
Prior experience in entrepreneurial education	Yes	16,3
	No	83.7

Source: Authors own conception, based on SPSS version 22 software

Table 2. Construct validity and reliability

Variable	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Attitude toward Entrepreneurship **(ATT)**	0,814	0,877	0,640
Entrepreneurial Education **(EE)**	0,899	0,925	0,712
Entrepreneurial Intention **(EI)**	0,917	0,936	0,708
Perceived Behavioral Control **(PBC)**	0,937	0,950	0,760
Self-Efficacy **(S-E)**	0,933	0,947	0,751
Subjective Norms **(SN)**	0,894	0,919	0,654

Source: Authors own conception, based on Smart PLS version 3.3.3 software

correlation between one construct and the other constructs' items. The output in Table 3 confirms this study's discriminant validity (Hair et al., 2017).

4.3. Structural model assessment

After confirming the reliability and validity of the measurement model, the assessment of the structural model is discussed. In this study, a bootstrap resampling method was applied with 1000 replicates and 518 cases to assess the significance of the path coefficients (Hair et al., 2017). The t-test values were obtained, and the significance of the established causal relationships was confirmed in Table 4. The results demonstrated a significant positive relationship between the Attitude toward entrerpeneurship and Entrepreneurial Intention (β = 0.,239, $p < 0.01$). Also, both Perceived Behavioral Control and Subjective Norms were positively related to Entrepreneurial Intention (β = 0,395, $p < 0.01$ and β = 0,260, $p < 0.01$, respectively) based on the path coefficients and t-statistic measurements.

To assess the mediation effect of the variables, this study followed the procedures recommended by Hair et al. (2017). Table 5 shows that three factors of TPB fully mediate the relationship

Table 3. Discriminant validity (Fornell-Larcker criterion)

	ATT	EE	EI	PBC	S-E	SN
ATT	**0,800**					
EE	0,448	**0,844**				
EI	0,583	0,594	**0,841**			
PBC	0,504	0,576	0,672	**0,872**		
S-E	0,476	0,610	0,769	0,827	**0,866**	
SN	0,556	0,616	0,631	0,603	0,619	**0,809**

Source: Authors own conception, based on Smart PLS version 3.3.3 software

Table 4. Results of hypothesis testing via bootstrapping

Path	Path Coefficient	SE	t-statistics	p-value	Decision
ATT -> EI	0,239	0,050	4,739	0,000	H1: supported
EE -> ATT	0,252	0,053	4,797	0,000	
EE -> PBC	0,113	0,034	3,359	0,001	
EE -> SN	0,380	0,057	6,663	0,000	
PBC -> EI	0,395	0,044	8,997	0,000	H2: supported
S-E -> ATT	0,322	0,052	6,158	0,000	
S-E -> PBC	0,758	0,029	25,755	0,000	
S-E -> SN	0,388	0,055	7,119	0,000	
SN -> EI	0,260	0,050	5,230	0,000	H3: supported

Source: Authors own conception, based on Smart PLS version 3.3.3 software

between Entrepreneurial Education and Entrepreneurial Intentions and the relationship between Self-Efficacy and Entrepreneurial Intention. The results in Table 5 indicate that PBC (β = 0,045, $p < 0.01$) mediated the relationship between EE and EI. ATT (β = 0,077, $p < 0.01$) and SN (β = 0,099, $p < 0.01$) were insignificant in mediating the relationship between EE and EI, with a significance level of $p < 0.01$. Besides, PBC (β = 0,3, $p < 0.01$) and SN (β = 0,101, $p < 0.01$) were insignificant in mediating the relationship between S-E and EI, with a significance level of $p < 0.01$. All of hypothesis H4 (a,b,c) and H5(a,b,c) are supported.

The R^2 value in Table 6 reflects exogenous latent variables' ability to predict endogenous latent variables (Cohen, 1988). The variation in endogenous constructs described by exogenous constructs was deemed sufficient in the study.

Table 5. Mediation analysis

	Path Coefficient	t-statistics (|O/STDEV|)	p-Values	Decision
EE -> PBC-> EI	0,045	3,118	0,002	H5b: supported
S-E ->ATT -> EI	0,077	3,272	0,001	H4a: supported
EE -> SN-> EI	0,099	3,710	0,000	H5c: supported
EE -> ATT-> EI	0,060	3,520	0,000	H5a: supported
S-E -> PBC-> EI	0,300	8,010	0,000	H4b: supported
S-E -> SN-> EI	0,101	4,277	0,000	H4c: supported

Source: Authors own conception, based on Smart PLS version 3.3.3 software

Table 6. Coefficients of determination (R_2)

	R Square	R Square Adjusted
Attitude toward Entrepreneurship (ATT)	0,267	0,264
Entrepreneurial Intention (EI)	0,569	0,567
Perceived Behavioral Control (PBC)	0,693	0,691
Subjective Norms (SN)	0,475	0,473

Source: Authors own conception, based on Smart PLS version 3.3.3 software

Table 7. *Prediction relevance (Q_2) test* (Geisser, 1974; Stone, 1974)

	SSO	SSE	Q^2 (=1-SSE/SSO)
Attitude toward Entrepreneurship (ATT)	2072,000	1737,495	0,161
Entrepreneurial Education (EE)	2590,000	2590,000	
Entrepreneurial Intention (EI)	3108,000	1879,175	0,395
Perceived Behavioral Control (PBC)	3108,000	1493,531	0,519
Self-Efficacy (S-E)	3108,000	3108,000	
Subjective Norms (SN)	3108,000	2164,526	0,304

Source: Authors own conception, based on Smart PLS version 3.3.3 software

The Stone-Geisser Q^2 values in Table 7 were all greater than zero, so the constructs can be accepted as having predictive relevance.

Figure 2 presents the PLS results of the research model.

5. Discussion and conclusion

5.1. Discussion

The objective of this study was to asssess the relationship between the three components of Theory of Planned Behaviour and the mediating effects of these components on the relationship between Entrepreneurial education and Self-Efficacy on Entrepreneurial intentions among engineering students in Vietnam. The findings show that Entrepreneurship education has a directly positive effect on Attitude toward entrepreneurship, Perceived behaviour control and Subjective norms of engineering student's entrepreneurial intention in Vietnam. This finding is consistent with many previous studies that confirm the role of entrepreneurial education on shaping entrepreneurial intention of students (Hasan et al., 2017; Kim & Park, 2018; Maheshwari & Kha, 2021; Mahlaole & Malebana, 2021; Mikić et al., 2019; Ngo et al., 2022; Varamäki et al., 2015; Khoi et al., 2021). Based on the results of the path analysis, Attitude toward entrepreneurship, Perceived behaviour control and Subjective norms mediate the relationship between Entrepreneurial education and Entrepreneurial education. However, this finding is inconsistent with the finding from Kusumojanto et al. (2021) which failed in explaining the role of entrepreneurship education and family education informing intention instead of stimulation students' entrepreneurial attitude. This contrast calls for further research to examine the role of Entrepreneurial educaion on shaping Entrepreneurial intention of students. Besides, Self-Efficacy also has a directly positive impact on Attitude toward entrepreneurship, Perceived behaviour control and Subjective norms. Self-Efficacy has been proven as the determinants of entrepreneurial intention (Shi et al., 2019; Shah et al., 2020; Doanh et al., 2021; Tomal & Szromnik, 2022; Anwar et al., 2022). The findings also confirm

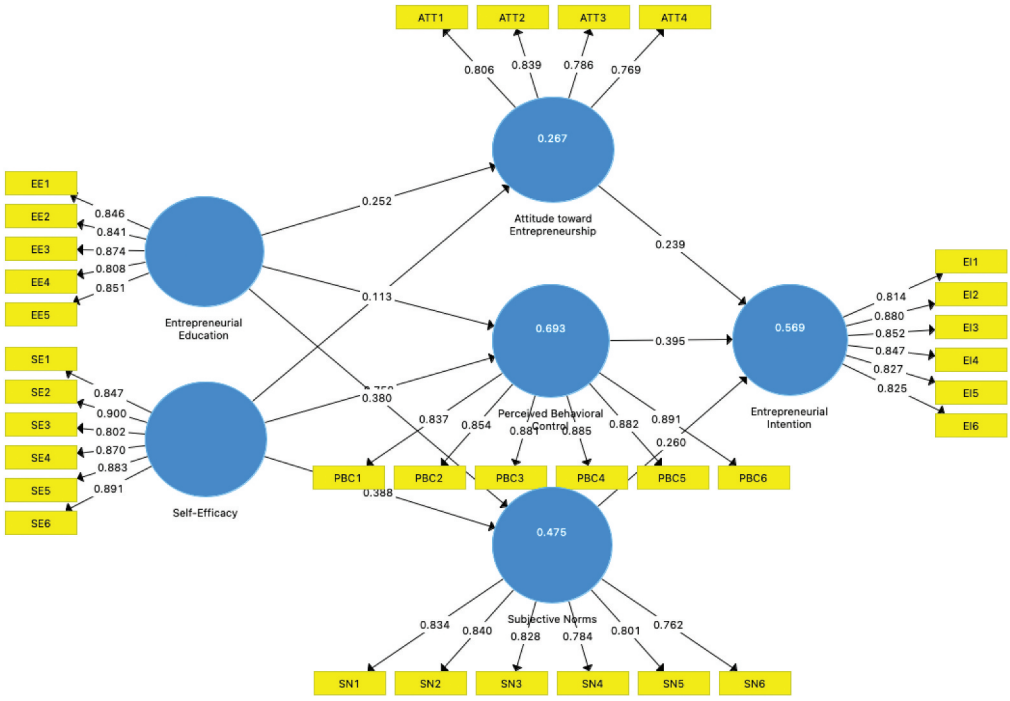


Figure 2. Graphical Representation of Structural Model.

Source: Authors own conception, based on Smart PLS version 3.3.3 software

mediating effects of the three component of TPB on the relationship between Entrepreneurial education and Entrepreneurial intention and it is consistent with other studies (Shi et al., 2019; Doanh et al., 2021; Gill et., 2021; Liao et al., 2022).

5.2. Practical implications

The finings of this research have some theorectical implications and practical implications to promote entrepreneurship among emerging students, especially in emerging economies in Asia. Entrepreneurship education is confirmed to have an indirectly impact on the entrepreneurial intention of engineering students. Entrepreneurship education also has positive relationship with Attitude towards entrepreneurship, Subjective norms, pPerceived behavioral control. Hence, higher education programs for engineering students must improve the practicality and business-oriented application in the cirriqulum. Universities must offer training modules in entrepreneurship in order to improve the perception of students' entrepreneurial intent (Boubker et al., 2021). Perceived behavioral control is the strongest factor affecting the entrepreneurial intention of engineering students with R square is 0.693. In order to encourage student's motivation to start a business, universities must equip engineering students the knowlegde and skills of how to set up and run a business. As engineering students masters business knowlegde and entrepreneurial skills, they are more likely to become entrepreneurs (Shi et al., 2019). Self-efficacy and learning orientation play an important part in explaining how entrepreneurship education relates to entrepreneurial intentions (Hoang et al., 2020). Therefore, universities should allow engineering students to participate in research projects or spin-off projects. Entrepreneurial self-efficacy can strengthens engineering students's ability to recognize and exploit business opportunities (Cox et al., 2002). Besides, Attitude toward entrepreneurship must be constructively nurtured. The entrepreneurial mindset and positive attitude towards setting up a business will be the background on the student's entrepreneurial career choice. Liao et al. (2022) also insist that entrepreneurial mindset is formed from entrepreneurial education, and that it plays a vital role in driving entrepreneurial intention. As a result, universities must establish start-up clubs and start-up incubation centers for engineering faculties. Subjective norms can be improved by creating the positive perception of everyone about the role of entrepreneurship. In addition, policymakers should widely

communicate about the entrepreneurial orientation so that people appreciate that entrepreneurship is the driving force for economic development.

5.3. Limitations and further research

This study have some limitations that further research could improve. Despite of being representative, the data in the study were collected by non-probability sampling method, so the sample size may not be broad enough to generalize the results and to compare different universities in Vietnam. Secondly, the respondents only come from six engineering faculties of IUH, so the implications cannot be generalized to all technical student in Vietnam. Thirdly, samples were collected at the moment of final student so it may lack of not discovering the development of student's entrepreneurial intention after graduations. Further research should investigate the evolution of the different determinants of entrepreneurial intention at different points of student's lifetime and the holistic effects of macro environments on entrepreneurship.

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Author details
Cuong Quoc Nguyen[1]
E-mail: nguyenquoccuong@iuh.edu.vn
ORCID ID: http://orcid.org/0000-0001-7842-0564
Anh Minh Tu Nguyen[2]
ORCID ID: http://orcid.org/0000-0001-6676-321X
Long Ba Le[3]
ORCID ID: http://orcid.org/0000-0003-3883-0424
[1] Faculty of Commerce and Tourism, Industrial University of Ho Chi Minh City, Vietnam.
[2] Office of Science Management and International Affairs, Industrial University of Ho Chi Minh City, Vietnam.
[3] Institute of Environmental Science, Engineering, and Management, Industrial University of Ho Chi Minh City, Vietnam.

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