What Tickles Your Fancy? The Case of Technology and Engineering Students Becoming Entrepreneurs

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ABSTRACT

Manuscript type: Research paper
Research aims: This research aims to investigate the factors affecting entrepreneurial intention among technology and engineering students.
Design/Methodology/Approach: Quantitative data were collected from 210 students majoring in technology and engineering. Data are then analysed using Smart PLS.
Research findings: Findings indicate that perceived desirability, perceived feasibility, need for achievement and need for autonomy have a significant relationship with entrepreneurial intention. This study highlights the role of entrepreneurship education programme as the moderating variable among technology and engineering students.
Theoretical contribution/Originality: This study expands on existing entrepreneurship literature. It looks at the issue from the perspective of technology and engineering students. The study seeks to determine the role of entrepreneurship education programme as the moderating variable.

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Practitioner/Policy implication: The findings of this study indicates the importance of entrepreneurship programme as a platform for graduate students to develop their entrepreneurial skills, which in turn would encourage them to be an entrepreneur.
Research limitation/Implications: Since this study measures entrepreneurial intention rather than entrepreneurs' actual behaviour, it has to be reminded that intentionality may not necessarily lead to actual behaviour.

Keywords: Technology, Engineering Students, Entrepreneurial Intention
JEL Classification: L26, L31

1. Introduction

Entrepreneurship is an activity to exploit products and services whereby a person follows chances regardless of the capital owned (Barringer & Ireland, 2016). The concept of entrepreneurship has gained a huge attention in today's age and time because of its importance and significance on economic growth, job creation, sources of innovation and productivity (Urbano & Aparicio 2016). In developing countries, entrepreneurship is seen as a means to stimulate economic development and to tackle social challenges (Ozaralli & Rivenburgh, 2016) such as unemployment. In the context of Malaysia, the rising rate of unemployment among graduate students has become one of the major concerns of the government. A report (Bernama, 2019) implied that almost 60 per cent of the local graduates were still unemployed a year after graduation. Taking the initiative to address this issue, the government has introduced various programmes with the purpose of encouraging university students to start their own business, even before graduating. It appears that having a business not only rules out unemployment for one student, it also has the capacity to create new employment for others. This practice can transform the perception of society, and the graduate students now become job creators rather than job seekers (Gelaidan & Abdullateef, 2017).

In view of the importance of entrepreneurship in fostering economic development, various studies (e.g., Karimi, Biemans, Lans, Chizari, & Mulder, 2016; Bolton & Lane, 2012; Sesen, 2013) have investigated the reasons that caused people to become interested in becoming entrepreneurs. The findings showed that certain factors were responsible, for example, personality, environment, business and

economics education programmes available, innovativeness, risk-taking attitudes, as well as educational and structural support. All these factors were key in motivating the individuals to take on entrepreneurship. All of these studies had also focussed on the student context. For example, Gelaidan and Abdullateef (2017) found that entrepreneurial intention among Malaysian students was highly influenced by educational support. In China, students were found to be more inclined towards entrepreneurship due to the existence of psychological capital. Despite the important insights offered by these studies, findings were also mainly focussed on business students except for Barba-Sánchez and Atienza-Sahuquillo (2018). Many of them seemed to have overlooked the fact that the idea of entrepreneurship is inherently ingrained within the engineering trade. Students from the engineering technology were better suited for entrepreneurship because of their ability to develop new technology-based companies, thereby creating new jobs for others whilst reducing unemployment rates (Steering Committee of the National Engineering Education Research Colloquie, 2006). As an elaboration, many of the big international firms such as Rolls-Royce, Intel, Oracle and Yahoo! were founded by engineers. Despite not having a 4-year degree in business or rntrepreneurship, these students had ventured and excelled in being entrepreneurs dealing with businesses that were both related and not related to their field of study. According to Law and Breznik (2017), there are several entrepreneurial traits that have been identified in engineering students and which influenced them into becoming entrepreneurs. These traits are noted as risk-taking, creativity and innovativeness. Engineering students who had chosen to be entrepreneurs possessed the risk-taking characteristic because they were not afraid of failure. Even in the worst case scenario, they were still able to make best decisions. On top of that, their high creativity and innovativeness also stimulated the engineering students to become entrepreneurs. They tended to be more creative in improving their current process and in developing new ideas. These traits were most noticeable in engineering students who had also taken entrepreneurial classes and programmes. Motivated by the above arguments, this study thus aims to investigate factors influencing entrepreneurial intention among technology and engineering students of a university in Malaysia. For this purpose, an empirical study involving 210 technology and engineering students attending an optional entrepreneurship program was developed. The outcome derived may be useful to the policy makers for understanding not only the pattern of relationship among intention

antecedents, but also its implications for intervention and for developing entrepreneurial intention.

The remainder of this paper is organised as follows. Section 2 presents the literature review and discusses the theoretical framework. Section 3 highlights the methodology. Sections 4 and 5 report and discuss the findings. Section 6 concludes the paper by providing the research implications and limitations.

2. Literature Review and Hypotheses

2.1 Entrepreneurship and its Importance in the Malaysian Context

An entrepreneur is a self-employed individual or person who operates a small business that takes on all the risks and benefits of the company he/she is working on. A successful entrepreneur must focus on creativity, innovation, dynamism, management, team building, performance, motivation and issue solving (Charantimath, 2006). Most entrepreneurs require technical and management skills and also entrepreneurial orientations (Adjimah & Perry, 2014), thus entrepreneurs need to be able to seize opportunities and to manage their resources effectively so as to produce goods and services for the consumption of others.

According to Soete and Stephen (2004), countries which focus on entrepreneurship and self-employment are experiencing an increased economic growth. Due to this, entrepreneurship is being given serious attention by governments, including Malaysia. To this end, the Malaysian government has narrowed its focus on entrepreneurship by helping and improving the industrial structure in order to create industries for the younger generation to explore. This can be noted from the national programmes and policies which had been established by the government to enhance entrepreneurial growth in the country. Entrepreneurship funds, physical infrastructure and company consultancy assistance were among the programmes that had been introduced. In its effort to transform Malaysia into an entrepreneurial nation and to curb unemployment problems, the government had also promoted the involvement of women and youths in entrepreneurship (Nor, 2015). As a result, there was a marginal rise in the number of entrepreneurs between 1982 and 2012 (Department of Statistics Malaysia, 2014) during which the number of entrepreneurs had increased from 1.3 to 2.6 million.

Similar to other countries, the school and education system play a significant role in enhancing and creating entrepreneurial characteristics

among students in Malaysia (Ibrahim & Soufani 2002; Ali, Hashim, & Ibrahim, 2017). One of the goals of encouraging entrepreneurship among students in schools and universities is to foster the desire of developing one's own interest for one's own future, i.e. to become a job creator rather than a job seeker. In setting up the entrepreneurship curriculum, universities are also striving to balance the academic standards of the students and those desired by the industry. The goal of the curriculum is to align it with the nation's goal of creating jobs that can help to improve the economy of the country (Keat, Selvarajah, & Meyer, 2011). All local universities in Malaysia are currently investing in entrepreneurship where many have also set up their own units or centres for entrepreneurship development. Universiti Teknikal Malaysia Melaka (UTeM), for example, has such a centre called the Centre for Enterprise and Technopreneurship Development (CREATE). Its aim is to encourage and enhance the entrepreneurship skills of its students. This shows that Malaysian universities are slowly adapting the entrepreneurship environment to prepare its graduates, including those from the technical and engineering background to establish their own businesses rather than to be working for others in the industry.

2.2 Entrepreneurial Intention

Intention is interpreted as the tendency people have in exercising their efforts in designing or applying a certain behaviour. In the context of entrepreneurship, Bird (1988) said that entrepreneurial intention can be explained as the mindset of the entrepreneur who is aiming at the attention, incident and activity so as to achieve the concept of business. The understanding of entrepreneurship intention is important because such intentions stimulates or triggers the entrepreneurial journey; it acts as a guidance for the individual in the actual development of a business (Iakovleva & Kolvereid, 2009).

Considering that entrepreneurial intention is an important behaviour that drives an individual to start a new business, many studies were conducted to explain the determinants. Many factors, such as cognitive and psychological traits (Siu & Lo, 2013; Isiwu & Onwuka, 2017), educational support (Gelaidan & Abdullateef, 2017), public policy (Sperber & Linder, 2019), and culture were identified from existing literature.

Focussing on entrepreneurship intention, past studies had also used university or college students as their target samples (e.g., Ismail et al. 2009; Turulja, Veselinovic, Agic & Pasic-Mesihovic, 2020; Gelaidan

& Abdullateef, 2017). Student samples were engaged in examining entrepreneurial intentions because they were thought to be in the state of a psychological process of making decisions on whether to venture into new business creations or to work for others (Liñán & Chen, 2009). Supporting the use of students as samples, Chuah, Ting, Run and Cheah (2016), stated that a clear understanding of entrepreneurial intention needs among students is imperative because they are the future potential entrepreneurs. In the Malaysian context, Mat, Maat and Mohd (2015) found that the need for autonomy and the need for achievement had a strong relationship with entrepreneurial intentions among their participants.

2.3 Underpinning Theory and Hypotheses Development

This study employed the entrepreneurial event model that was developed by Shapero (1982). This theory asserts that an individual's choice to embrace a new venture depends on three factors: the perception of the desirability and the propensity to act, and the perception of feasibility. This model had been empirically tested by many studies (e.g., Tiwari, Bhat, & Tikoria, 2020; Omidi Najafabadi, Zamani, & Midamadi, 2016; Zhang, Duysters, & Cloodt, 2014).

While the model had proposed three elements, it appears that perceived desirability and perceived feasibility were the main factors that contributed towards entrepreneurial intention among students (Davids, 2017; Liñán, Rodríguez-Cohard, & Rueda-Cantuche, 2011). Following this trend of development, the current study also includes perceived desirability and perceived feasibility as variables so as to determine the level of entrepreneurial intention among the technology and engineering students. In addition to these two variables, two other important variables, need for autonomy and need for achievement were also integrated into the original research model (Shapero, 1982).

The study by Dan, Chenchen and Yuchen (2019) had noted that a higher need for autonomy would lead to higher entrepreneurial intention among Chinese postgraduates. However, among accounting students, it was their ambition of becoming a partner in an existing CPA firm or starting their own CPA firm that seemed to affect their high entrepreneurial intention (Lam, Azriel, & Swanger, 2017). Thus, the variables "need for autonomy" and "need for achievement" were included in this study. The aim was to examine whether the intention of becoming an entrepreneur was the result of the individual need to have

autonomy in making decisions and to be able to achieve the outcomes that they have set for themselves (Chen, Elliot, & Sheldon, 2019; Lammers, Stoker, Rink, & Galinsky, 2016). The following highlights the hypotheses developed in this study.

Perceived desirability can be described as the extent of attraction an individual has towards a specific behaviour (Davids, 2017). An individual who has higher perceived desirability tend to view entrepreneurship as an appealing and attractive career. These individuals would display a favourable attitude and more enthusiasm towards entrepreneurship. They believe that the successful creation of a new venture would lead to net benefits. A high desirability towards independence, extra income and taste of challenge and variety are also the reasons why some individuals would develop a positive attitude towards entrepreneurship and ideas. This shows that entrepreneurship is considered to be the best option as long as it is viewed as professionally stimulating, and financially rewarding. Based on these arguments, this study postulates that:

H_1: Perceived desirability is positively related to entrepreneurial intention.

Perceived feasibility reflects the individual's perception on their personal capability to do a certain job or task (Bandura, 1995). It is the individual's perception of how difficult or easy it is to initiate a start-up behaviour. Within the context of entrepreneurship, individuals who perceive that they have capability in terms of skills, knowledge and personality to be a successful entrepreneur would be more willing and more interested in embracing new business creations. This is because they believe and are confident that they could manage the business well (Godsey & Sebora, 2010). Individuals who perceive that they have the capabilities tend to have the perception that they could learn faster. Based on these arguments, this study postulates that:

H_2: Perceived feasibility is positively related to entrepreneurial intention.

McClelland, Atkinson, Clark and Lowell (1976) revealed that the concept of the need for achievement could be referred to as the individual desire to get achievements and to master the competencies, supervision or high standards. Individuals with a higher need for achievements are called risk-takers. They set challenging objectives for themselves and they take some potential threats to achieve those

objectives. They regard goal accomplishments as a set of reward and they appreciate these more than the financial reward. Their need for achievement is also one of the factors that contribute to entrepreneurship among the technology engineering students (Mat, Maat, & Mohd, 2015). A fundamental feature of personality trait such as the need for achievement can affect the person's entrepreneurial intention (Karabulut, 2016; McClelland et al., 1976). Individuals who have a strong need for achievement have a powerful desire to be successful in their lives. They expect their decision to bring them good results. Studies also noted that individuals with a high need for achievement also had a low acceptability for failure (Steinmayr, Weidinger, Schwinger, & Spinath, 2019). Individuals who have a higher need for achievement tend to have higher levels of entrepreneurial potential as an indication of their desire and capacity to engage in the entrepreneurial activities (Zeffane, 2013). Based on these arguments, this study postulates that:

H_3: The need for achievement is positively related to entrepreneurial intention.

The need for autonomy can be explained as the ability of individuals to make choices according to their own free will or preference. The characteristics that are suitable to be described under the need for autonomy are: they like doing unconventional things, they prefer to work alone, they have to do "own things", they have to express what they think, they hate to take control of others, they like to make up their own minds, they do not bow to group pressure, they are stubborn, and they are determined (Mohamed, Rezai, Nasir Shamsudin, & Mu'az Mahmud, 2012).

According to Martin and Javalgi (2018), the need for autonomy positively corresponded with entrepreneurial intention. Individuals who already have a higher need for autonomy may pursue to maintain or improve that level through entrepreneurial activities. As indicated by Wickham (2004), most of the entrepreneurs have a need for independence. They aspire to be their own bosses. One of the main reason why people intend to be an entrepreneur is because they want to be their own boss; they do not want to be imposed by others' rules and regulations. Based on these arguments, this study postulates that:

H_4: The need for autonomy is positively related to entrepreneurial intention.

Whilst perceived desirability and perceived feasibility are expected to encourage students to consider entrepreneurship as a career opportunity, an individual may have a change in behaviour when the push and pull factors set in. Such changes may alter the perception of the individual on whether the level of desirability and feasibility possessed would be sufficient for undertaking entrepreneurship. In the educational environment, the change of attitude may depend on the educational support provided.

The entrepreneurship development programme, known as EDP is a short-term approach to address the crisis of unemployment. The EDP is aimed at moving entrepreneurship among youths into the mainstream of the economy, along with the growth-oriented and sustainable businesses (Awongbenle & Iwuamadi, 2010). It was further observed by Awongbenle and Iwuamadi (2010) that the entrepreneurship development programme acted as a mechanism which would inform youths about the world of business and the possibilities of setting up their own businesses. Entrepreneurship development programmes thus give the youths more awareness about entrepreneurship and enterprises. The goal of the EDP is to assist the youths into considering realistically the alternatives for starting a small business or self-employment. Hence, the EDP could support and equip students with the necessary technical skills, personal entrepreneurial skills and management skills, all of which are important elements for promoting student readiness in starting new businesses (Roxas & Azmat, 2014). Based on these arguments, this study postulates that:

H_5: Entrepreneurship development programmes moderate the relationship between perceived desirability and entrepreneurial intention.

H_6: Entrepreneurship development programmes moderate the relationship between perceived feasibility and entrepreneurial intention.

Based on the above hypotheses, a conceptual framework (Figure 1) was formulated.

3. Data and Methodology

This study is quantitative in nature. The survey method was used to extract data based on designed questionnaires which were distributed

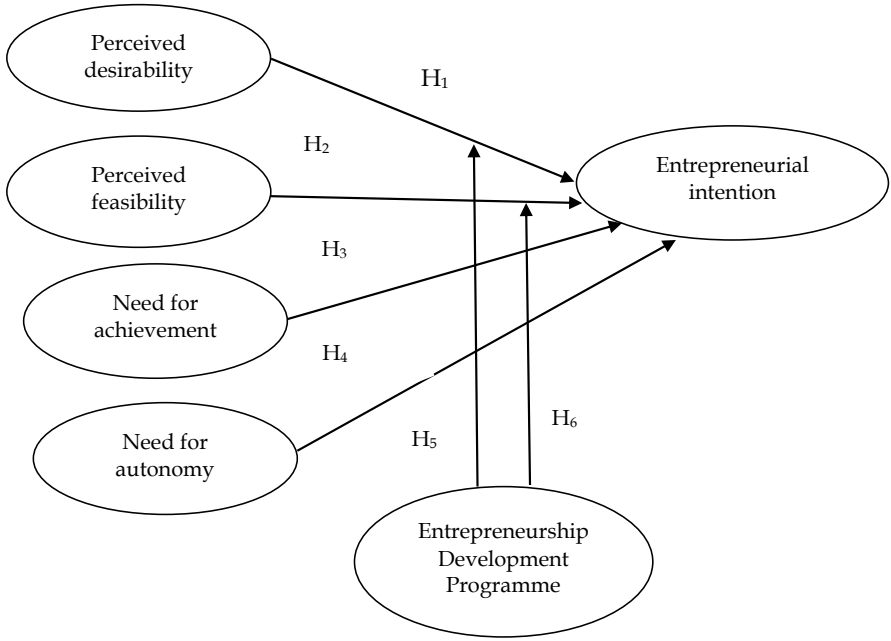

Figure 1: Conceptual Framework

to a group of undergraduates studying technology and engineering in a local university. The measurements used were adapted from previous studies (see Appendix).

The target sample used in this study comprised 210 final year undergraduates studying at Universiti Teknikal Malacca, Malaysia. This university focusses on producing technology and engineering graduates. It also has a dedicated centre, Centre for Enterprise and Techno-preneurship Development, also known as CREATE. One of the aims of this centre is to facilitate the technology and engineering students into obtaining knowledge and skills to help them start their business, rather than to work in the industry. It also serves as a platform to promote and encourage the students into gaining entrepreneurship skills.

For this study, the university's registrar was contacted through email to secure permission and support for conducting the survey in the university. Based on the list provided by the university's registrar, there were 1,960 final year degree students in the field of technology and engineering. A total of 1,000 students who were taking courses in the campus and not undergoing practical training, were contacted

through email with an attachment containing the questionnaire, information about the study, instruction for questionnaire completion and an assurance of confidentiality. A cover letter explaining the study was also provided. It also explained that the survey was voluntary and confidential and that no individual results can be identified from the report. Of the 1000 questionnaires distributed, a total of 210 questionnaires were retrieved and used for analysis. Table 1 depicts the descriptive statistics on the respondents' profiles. It appears that a majority of the

Table 1: Demographic Profiles

Demographics	Frequency	Percentage (%)
Gender		
Females	109	51.9
Males	101	48.1
Faculty		
FTMK	29	13.8
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FTKMP	31	14.8
FTKEE	30	14.3
FKP	29	13.8
FKEKK	32	15.2
FKE	30	14.3
Age		
20-25 years old	194	92.4
26-30 years old	12	5.7
More than 30 years old	4	1.9
Race		
Malay	141	67.1
Indian	29	13.8
Chinese	39	18.6
Others	1	0.5

Note: FTMK: Fakulti Teknologi Maklumat dan Komunikasi (Faculty of Information and Communication Tehnology), FKM: Fakulti Kejuruteraan Mekanikal (Faculty of Mechanical Engineering), FTKMP: Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan (Faculty of Mechanical and Manufacturing Engineering Technology), FTKEE: Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik (Faculty of Electrical and Electronic Engineering Technology) FKP: Fakulti Kejuruteraan Pembuatan (Faculty of Manufacturing Engineering), FKEKK: Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer (Faculty of Electronic and Computer Engineering), FKE: Fakulti Kejuruteraan Elektrik (Faculty of Electrical Engineering).

respondents were Malay and between the age of 20 to 25 years old. They were equally distributed among genders and faculties. These results show that the samples are broadly representative of the final year students of the university.

4. Results and Discussion

This study employed structural equation modelling using SMART PLS to analyse the measurement and structural model. In line with Anderson and Gerbing (1988), the two-step procedure was utilised, whereby the measurement model was first examined to measure convergent validity and discriminant validity. A structural model analysis was then performed to test the hypotheses.

4.1 Measurement Model

A measurement model analysis comprising the five constructs was performed. The convergent validity was examined based on the factor loadings, composite reliability, and average variance extracted (AVE). As indicated in Table 2, all the constructs appear to have factor loading, composite reliability and AVE values of above 0.5, indicating an acceptable convergent validity (Hair, Black, Babin, & Anderson, 2010).

In this study, the discriminant validity was assessed by comparing the inter-correlation between the constructs and their square root of AVE values (Fornell & Larcker, 1981). As indicated in Table 3, all the constructs have a square root of AVE values that are more in comparison with their correlations with others, implying an adequate discriminant validity.

Based on the results of the measurement model, it is deduced that all the constructs have achieved substantial reliability and validity. The model is found to be suitable for the structural model analysis and hypotheses testing.

4.2 Structural Model Analysis

A 5,000 resample of bootstrapping procedure was performed to test the structural model and the hypotheses developed. As indicated in Figure 2, the R^2 value of entrepreneurial intention is 0.563. This value is above the threshold value of 0.333, indicating a moderate model. Path coefficient was then used to examine the strength of the relationships.

Table 2: Convergent Validity

Constructs	Outer Loadings	Composite Reliability	AVE
Perceived desirability (PD)		0.894	0.680
PD1	0.845		
PD2	0.896		
PD3	0.743		
PD4	0.805		
Perceived feasibility (PF)		0.852	0.527
PF1	0.813		
PF2	0.861		
PF3	0.832		
PF4	0.784		
PF5	0.672		
Need for achievement (NFA)		0.835	0.506
NFA1	0.748		
NFA2	0.593		
NFA3	0.788		
NFA4	0.683		
NFA5	0.728		
Need for autonomy (NFB)		0.844	0.578
NFB1	0.820		
NFB2	0.714		
NFB3	0.830		
NFB4	0.663		
Entrepreneurial intention (EI)	0.791	0.511	
EI1	0.898		
EI2	0.901		
EI3	0.582		
Entrepreneurship development programme (EDP)		0.687	0.55
EDP1	0.865		
EDP2	0.651		
EDP3	0.663		

Table 3: Discriminant Validity

	PD	PF	NFA	NFB	EDP	EI
PD	**0.820**					
PF	0.663	**0.730**				
NFA	0.322	0.441	**0.711**			
NFB	0.344	0.462	0.660	**0.766**		
EDP	0.351	0.452	0.554	0.334		
EI	0.530	0.609	0.320	0.350	0.554	**0.711**

Notes: Diagonal elements report the squared root of AVE values. PD = perceived desirability, PF = perceived feasibility, EDP = entrepreneurship development programme, EI = entrepreneurial intention.

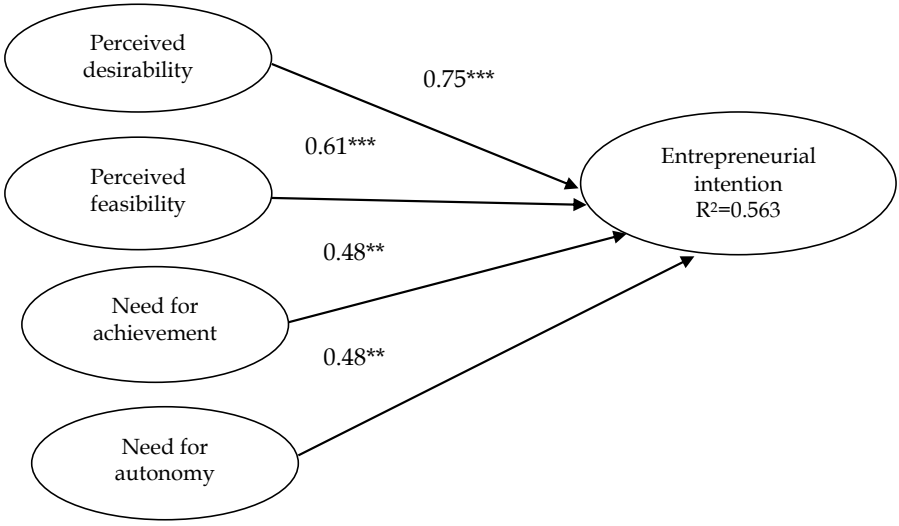

Figure 2: Structural Model for the Direct Effect
Note: ***p<0.001, **p<0.05.

It shows perceived desirability (β = 0.75, t = 6.615, p < 0.001), perceived feasibility (β = 0.61, t = 3.74, p < 0.001), need for achievement (β = 0.48, t = 2.01, p = 0.02), and need for autonomy (β = 0.48, t = 1.99, p = 0.03) to be significant with entrepreneurial intention. Hence, H_1, H_2, H_3 and H_4 are supported.

In addition to the direct effect, we also performed the moderation analysis to examine the impact of education development programmes on the relationship between perceived desirability, perceived feasibility, and entrepreneurial intention. Interaction effects were computed through the product indicator approach. The significance of the interaction effect was assessed using a bootstrapping procedure (5,000 resamples) (Hair, Ringle, Sarstedt, 2011). The R^2 had increased from 0.563 (main effect model) to 0.64 (interaction effect model). The path coefficients were also found to be significant, indicating that entrepreneurship development programmes acted as a moderator between perceived desirability and entrepreneurial intention ($\beta = 0.64$, $t = 6.68$, $p < 0.001$), and perceived feasibility and entrepreneurial intention ($\beta = 0.36$, $t = 3.75$, $p < 0.001$) (Table 4). Hence, H_4 and H_5 are supported.

Table 4: Moderating Effect

Path	β	t-value	p-value	Results
PD * EDP → EI	0.64	6.68	0.000	Accepted
PF * EDP → EI	0.36	3.75	0.000	Accepted

Notes: PD = perceived desirability, PF = perceived feasibility, EDP = entrepreneurship development programme, EI = entrepreneurial intention.

This study has provided empirical evidence showing the effect of perceived desirability, perceived feasibility, need for achievement and need for autonomy as predictors of entrepreneurial intention. The significant effect of perceived desirability on entrepreneurial intention in this study appears to be consistent with Davids (2017). Decades before this kind of intervention, Malaysian graduates only thought about a well-defined career path, where children would commonly follow the desire of their parents or elders in taking up a profession. However, the expansion of the social media as a platform, and other great advances of technology applications have opened up new horizons and unexplored opportunities for the young and ambitious graduates. This opportunity has influenced them into feeling unsatisfied with being just an employee in the industry. The success stories of many young Malaysian entrepreneurs such as Vivy Yusof, the founder of FashionValet and dUCk Group, who was listed in Forbes Asia could have instilled a strong desire among the other youths to become an entrepreneur.

Thus, it is not surprising that perceived desirability had emerged as the strongest predictor.

On a similar note, this study also found perceived feasibility to be an influencing factor. The outcome is consistent with Godsey and Sebora (2010). The higher the competencies, skills and resources possessed by the students, the stronger their willingness to embrace entrepreneurship. These results are predictable considering that the students in the sample received substantial support from CREATE. At this centre, the students are given training and other development programmes that could help them to gain related entrepreneurship knowledge and skills. These skills are expected to prepare them for self-employment when they graduate. Notwithstanding this, the technology and engineering students are also found to have a strong attitude towards rebuilding self-confidence after a setback. They responded positively to failure and they remained optimistic, as noted in prior studies. These characteristics have perhaps contributed to their higher perceived feasibility which led to their willingness to venture into a new business opportunity.

In this study, we have found that entrepreneurship development programmes moderated the relationship between perceived desirability, perceived feasibility, and entrepreneurial intention. Respondents who have received higher levels of entrepreneurship education have a stronger desire to be entrepreneurs. They also have higher confidence to start a new business. This result shows that entrepreneurship education, such as the one provided by CREATE, could provide students with clearer expectations of what is needed to be a successful entrepreneur. As they received more educational support, they would become more confident in their ability to evaluate entrepreneurial opportunities and to secure resources (Maresch, Harms, Kailer, & Wimmer-Wurm, 2016).

Our results also show that respondents who perceive a higher need for autonomy and achievement are more attracted towards considering entrepreneurship as their profession. Autonomy is strongly related to entrepreneurship in a sense that by being an entrepreneur, one can decide what, how, and when work would be done. By being an entrepreneur, one can also have the freedom to make decisions. In the context of this study, the result is expected since the respondents are mainly from the millennial generation. Studies have shown that millenials want the independence to work in the way they prefer. For them, flexible scheduling and work-from-home opportunities are the key factors in their decision to embrace a certain profession (Berkup, 2014). On a similar note, millennials have also been found to be highly

motivated for achievement, and as a result, they would try to excel in the tasks and to perform their duties as best as they can, optimising all the existing resources, skills and abilities possessed (Mahmood, Mamun, & Ibrahim, 2020). These characteristics make them suitable to be entrepreneurs.

5. Conclusion and Implications

This research has set out to investigate factors affecting entrepreneurial intention among the technology and engineering students, by focussing on the interactions of five different variables, namely: perceived desirability, perceived feasibility, need for achievement, need for autonomy and entrepreneurship development programmes on entrepreneurial intention. This study has also sought to expand on previous studies by focussing on the technology and engineering students to see what factors would affect their decision to become entrepreneurs. The entrepreneurship development programmes offered by CREATE was added as the moderator. The findings show that these students may require educational support to boost their desirability and feasibility to be an entrepreneur. Where previously graduates were more likely to work in the industry, today, the youths seem more incline to try out being an entrepreneur. This study utilised Shapero's entrepreneurial intention model by incorporating two important variables – need for autonomy and need for achievement as variables to assess the characteristics of the millennial generation.

The findings of this study show that the initiatives of universities such as UTEM in dedicating a centre for the entrepreneurship programme is a positive move. It enables and encourages the graduates to become entrepreneurs. This has helped to open up an additional avenue for the younger generation of this country to develop their future. By opting to become entrepreneurs, the younger generation will also be contributing to the economy of the country. This endeavour would encourage more innovations, more job openings and more independence, thereby reducing unemployment. The findings of this study also imply that the entrepreneurship programme established by local universities should not be confined to the business graduates only. Instead, graduates from different faculties such as technology, science and engineering should also be exposed. Notwithstanding the university, the government and policy makers need to initiate new outlooks of developing an appropriate platform for youths in the rural

areas. This can promote them to develop the need for achievement and autonomy since these youths have lesser opportunities. For such groups, the government may consider organising trainings which can be extended to these youths. By developing these two needs of the younger generation, their desirability to be an entrepreneur could be elevated. They would have more confidence to venture into this profession as they have gained the knowledge and skills to kick start this aspiration.

Despite the substantial contributions generated from the current study, there are also some limitations in this study. First, the samples used were confined to the technology and engineering students from UTEM. Future research may extend on the population by including those from different universities. Second, the findings are confined to the technology and engineering students. Future research may conduct a comparative analysis of the various students from various backgrounds of study. This would provide a more diverse input in terms of values and personality traits, which may contribute to the impact on their entrepreneurial intention.

References

Adjimah, P.H., & Perry, A.L., (2014). Effectiveness of entrepreneurship development programs in Ghanaian polytechnics. *International Review of Management and Marketing, 4*(1), 78-89.

Ali, M.M., Hashim, N., & Ibrahim, A. (2017). The evaluations of Facebook as an educational technology tools in polytechnic's entrepreneurship courses. *Journal of Fundamental and Applied Sciences*, 9(6S), 805-815. http://dx.doi.org/10.4314/jfas.v9i6s.60

Anderson, J.C., & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411-423.

Awogbenle, A.C., & Iwuamadi, K.C., (2010). Youth unemployment: Entrepreneurship development programme as an intervention mechanism. *African Journal of Business Management, 4*(6), 831-835.

Bandura, A. (1995). *Self-efficacy in changing societies*. Cambridge, United Kingdom: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511527692

Barba-Sánchez, V., & Atienza-Sahuquillo, C. (2018). Entrepreneurial intention among engineering students: The role of entrepreneurship education. *European Research on Management and Business Economics, 24*(1), 53-61. http://dx.doi.org/10.1016/j.iedeen.2017.04.001

Barringer, B.R., & Ireland, D.R. (2016). Entrepreneurship: Successfully launching new ventures. *Instructor*, 463, 529-569.

Berkup, S.B. (2014). Working with generations X and Y in generation Z period: Management of different generations in business life. *Mediterranean Journal of Social Sciences, 5*(19), 218.

Bernama (2019, October 15). Minister: Almost 60pc of graduates remain unemployed a year after graduation. *Malay Mail*, Retrieved from https://www.malaymail.com/news/malaysia/2019/10/15/minister-almost-60pc-of-graduates-remain-unemployed-a-year-after-graduation/1800574

Bird, B. (1988). Implementing entrepreneurial ideas: The case for intention. *Academy of Management Review, 13*(3), 442-453. http://dx.doi.org/10.2307/258091

Bolton, D.L., & Lane, M.D. (2012). Individual entrepreneurial orientation: Development of a measurement instrument. *Education + Training, 54*(2/3), 219-233. http://dx.doi.org/10.1108/00400911211210314

Boukamcha, F. (2015). Impact of training on entrepreneurial intention: An interactive cognitive perspective. *European Business Review, 27*(6), 593-616. http://dx.doi.org/10.1108/EBR-12-2014-0090

Charantimath, P.M. (2006). *Entrepreneurship development and small business enterprises*. New Delhi: Dorling Kindersley (India) Pvt.

Chen, C., Elliot, A.J., & Sheldon, K.M. (2019). Psychological need support as a predictor of intrinsic and external motivation: The mediational role of achievement goals. *Educational Psychology, 39*(8), 1090-1113. http://dx.doi.org/10.1080/01443410.2019.1618442

Chuah, F., Ting, H., Run, E.C., & Cheah, J.-H. (2016). Reconsidering what entrepreneurial intention implies: The evidence from Malaysian university students. *International Journal of Business and Social Science, 7*(9), 85-98.

Dan, Y., Chenchen, K., & Yuchen, C. (2019). Research on the factors influencing the entrepreneurial intention of postgraduates in local universities. *Research in Higher Education of Engineering, (2)*, 29-45.

Davids, F. (2017). *The theory of planned behaviour and the entrepreneurial event model as predictive models of entrepreneurial intention* (Doctoral dissertation, University of Cape Town, Cape Town, South Africa). Retrieved from https://open.uct.ac.za/bitstream/handle/11427/27299/thesis_hum_2017_davids_fawwaaz.pdf?sequence=4

Department of Statistics Malaysia. (2014). *Labour force survey report Malaysia*. Putrajaya: Author. Retrieved from www.dosm.gov.my

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50. http://dx.doi.org/10.2307/3151312

Gelaidan, H.M., & Abdullateef, A.O. (2017). Entrepreneurial intentions of business students in Malaysia. *Journal of Small Business and Enterprise Development, 24*(1), 54-67. http://dx.doi.org/10.1108/JSBED-06-2016-0078

Godsey, M.L., & Sebora, T.C. (2010). Entrepreneur role models and high school entrepreneurship career choice: Results of a field experiment. *Small Business Institute Journal, 5*(1), 83-125.

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate data analysis: A global perspective*. Upper Saddle River, NJ: Pearson.

Hair, J.F., Ringle, C.M., Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory Practice. 19*(2), 139-152. http://dx.doi.org/10.2753/MTP1069-6679190202

Iakovleva, T., & Kolvereid, L. (2009). An integrated model of entrepreneurial intentions. *International Journal of Business and Globalisation, 3*(1), 66-80. http://dx.doi.org/10.1504/IJBG.2009.021632

Ibrahim, A.B., & Soufani, K. (2002). Entrepreneurship education and training in Canada: A critical assessment. *Education + Training, 44*(8/9), 421-430. http://dx.doi.org/10.1108/00400910210449268

Isiwu, P.I., & Onwuka, I. (2017). Psychological factors that influences entrepreneurial intention among women in Nigeria: A study based in South East Nigeria. *The Journal of Entrepreneurship, 26*(2), 176-195. http://dx.doi.org/10.1177/0971355717708846

Ismail, M., Khalid, S.A., Othman, M., Jusoff, H.K., Rahman, N.A., Kassim, K.M., & Zain, R.S. (2009). Entrepreneurial intention among Malaysian undergraduates. *International Journal of Business and Management, 4*(10), 54-60. http://dx.doi.org/10.5539/ijbm.v4n10p54

Karabulut, A.T. (2016). Personality traits on entrepreneurial intention. *Procedia – Social and Behavioral Sciences, 229*(August), 12-21. http://dx.doi.org/10.1016/j.sbspro.2016.07.109

Karimi, S., Biemans, H.J., Lans, T., Chizari, M., & Mulder, M. (2016). The impact of entrepreneurship education: A study of Iranian students' entrepreneurial intentions and opportunity identification. *Journal of Small Business Management, 54*(1), 187-209. http://dx.doi.org/10.1111/jsbm.12137

Keat, O.Y., Selvarajah, C., & Meyer, D. (2011). Inclination towards entrepreneurship among university students: An empirical study of Malaysian university students. *International Journal of Business and Social Science, 2*(4), 206-220.

Lam, M., Azriel, J., & Swanger, S.L. (2017). *A pilot study examining the role of entrepreneurial intent and need for achievement in accounting students' career aspirations*. In United States Association for Small Business and Entrepreneurship. Conference Proceedings (pp. 849-875). Boca Raton, FL: United States Association for Small Business and Entrepreneurship.

Lame, S.M., & Yusoff, W.F.W. (December, 2013). *The perception of students towards entrepreneurship courses: An empirical study of Nigerian polytechnics students*. Paper presented at the 2nd International Conference on Technology Management, Business and Entrepreneurship, Mahkota Hotel Melaka, Malaysia.

Lammers, J., Stoker, J.I., Rink, F., & Galinsky, A.D. (2016). To have control over or to be free from others? The desire for power reflects a need for autonomy. *Personality and Social Psychology Bulletin, 42*(4), 498-512. http://dx.doi.org/10.1177/0146167216634064

Law, K.M., & Breznik, K. (2017). Impacts of innovativeness and attitude on entrepreneurial intention: Among engineering and non-engineering students. *International Journal of Technology and Design Education, 27*(4), 683-700. http://dx.doi.org/10.1007/s10798-016-9373-0

Lepoutre, J., Van den Berghe, W., Tilleuil, O., & Crijns, H. (2011). A new approach to testing the effects of entrepreneurship education among secondary school pupils. In M. Raposo, D. Smallbone, K. Balaton, & L. Hortoványi (Eds.), *Entrepreneurship, growth and economic development* (pp. 94-117). United Kingdom: Edward Elgar Publishing. http://dx.doi.org/10.4337/9780857934901.00010

Liñán, F., & Chen, Y.-W. (2009). Development and cross–cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship Theory and Practice, 33*(3), 593-617. http://dx.doi.org/10.1111/j.1540-6520.2009.00318.x

Liñán, F., Rodríguez-Cohard, J.C. & Rueda-Cantuche, J.M. (2011). Factors affecting entrepreneurial intention levels. *International Entrepreneurship and Management Journal, 7*(2), 195-218. http://dx.doi.org/10.1007/s11365-010-0154-z

Mahmood, T.M.A.T., Mamun, A.A., & Ibrahim, M.D. (2020). Attitude towards entrepreneurship: A study among Asnaf Millennials in Malaysia. *Asia Pacific Journal of Innovation and Entrepreneurship, 14*(1), 2-14. http://dx.doi.org/10.1108/APJIE-06

Maoto, K. & Van Niekerk, J.T. (2014). General enterprising tendencies amongst grade ten learners of Limpopo Province, Capricorn District Municipality. *Mediterranean Journal of Social Sciences, 5*(27), 184-198. http://dx.doi.org/10.5901/mjss.2014.v5n27p184

Maresch, D., Harms, R., Kailer, N., & Wimmer-Wurm, B. (2016). The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technological Forecasting and Social Change, 104*(March), 172-179. http://dx.doi.org/10.1016/j.techfore.2015.11.006

Martin, S.L., & Javalgi, R.R.G. (2018). Epistemological foundations of international entrepreneurship. *International Entrepreneurship and Management Journal, 14*(3), 671-680. http://dx.doi.org/10.1007/s11365-018-0517-4

Mat, S.C., Maat, S.M., & Mohd, N. (2015). Identifying factors that affecting the entrepreneurial intention among engineering technology students. *Procedia – Social and Behavioral Sciences, 211*(November), 1016-1022. http://dx.doi.org/10.1016/j.sbspro.2015.11.135

McClelland, D.C., Atkinson, J.W., Clark, R.A., & Lowell, E.L. (1976). *The achievement motive*. New York, NY: Irvington.

Mohamed, Z., Rezai, G., Nasir Shamsudin, M., & Mu'az Mahmud, M. (2012). Enhancing young graduates' intention towards entrepreneurship development in Malaysia. *Education + Training, 54*(7), 605-618. http://dx.doi.org/10.1108/00400911211265648

Nor, N.A.A.M. (2015). *Entrepreneurship development policy in Malaysia*. Serdang, Selangor: Economic and Social Science Research Centre, Malaysian Agricultural Research and Development Institute (MARDI).

Omidi Najafabadi, M., Zamani, M., & Mirdamadi, M. (2016). Designing a model for entrepreneurial intentions of agricultural students. *Journal of Education for Business, 91*(6), 338-346. http://dx.doi.org/10.1080/08832323.2016.1218318

Ozaralli, N., & Rivenburgh, N.K. (2016). Entrepreneurial intention: Antecedents to entrepreneurial behavior in the U.S.A. and Turkey. *Journal of Global Entrepreneurship Research, 6*(3), 1-32. http://dx.doi.org/10.1186/s40497-016-0047-x

Roxas, H.B., & Azmat, F. (2014). Community social capital and entrepreneurship: Analyzing the links. *Community Development, 45*(2), 135-150. http://dx.doi.org/10.1080/15575330.2014.880495

Sesen, H. (2013). Personality or environment? A comprehensive study on the entrepreneurial intentions of university students. *Education + Training, 55*(7), 624-640. http://dx.doi.org/10.1108/ET-05-2012-0059

Shapero, A. (1982). Social dimensions of entrepreneurship. In C. Kent (Ed.), *The Encyclopedia of Entrepreneurship* (pp. 72-90). Englewood Cliffs, NJ: Prentice-Hall.

Siu, W.S., & Lo, E.S.C. (2013). Cultural contingency in the cognitive model of entrepreneurial intention. *Entrepreneurship Theory and Practice, 37*(2), 147-173. http://dx.doi.org/10.1111/j.1540-6520.2011.00462.x

Soete, B., & Stephan, A. (2004). Introduction: Entrepreneurship, innovation, and growth. *Industry and Innovation, 11*(3), 161-165. http://dx.doi.org/10.1080/1366271042000265357

Sperber, S., & Linder, C. (2019). Gender-specifics in start-up strategies and the role of the entrepreneurial ecosystem. *Small Business Economics, 53*(2), 533-546. http://dx.doi.org/10.1007/s11187-018-9999-2

Steinmayr, R., Weidinger, A.F., Schwinger, M., & Spinath, B. (2019). The importance of students' motivation for their academic achievement – replicating and extending previous findings. *Frontiers in Psychology, 10*(July), 1-11. http://dx.doi.org/ 10.3389/fpsyg.2019.01730

The Steering Committee of the National Engineering Education Research Colloquies. (2006). The research agenda for the new discipline of engineering education (Special Report). *Journal Engineering Education, 95*(4), 259-261. http://dx.doi.org/10.1002/j.2168-9830.2006.tb00900.x

Tiwari, P., Bhat, A.K., & Tikoria, J. (2020). Mediating role of prosocial motivation in predicting social entrepreneurial intentions. *Journal of Social Entrepreneurship, 11*(May), 1-24. http://dx.doi.org/10.1080/19420676.2020.1755993

Turulja, L., Veselinovic, L., Agic, E., & Pasic-Mesihovic, A. (2020). Entrepreneurial intention of students in Bosnia and Herzegovina: What type of support matters? *Economic Research-Ekonomska Istraživanja, 33*(March), 1-20. http://dx.doi.org/10.1080/1331677X.2020.1730216

Urbano, D., & Aparicio, S. (2016). Entrepreneurship capital types and economic growth: International evidence. *Technological Forecasting and Social Change, 102*(January), 34-44. http://dx.doi.org/10.1016/j.techfore.2015.02.018

Wickham, P. (2004). *Strategic entrepreneurship: A decision-making approach to new venture creation*. London, UK: Prentice Hall.

Zeffane, R. (2013). Need for achievement, personality and entrepreneurial potential: A study of young adults in the United Arab Emirates. *Journal of Enterprising Culture, 21*(1), 75-105. http://dx.doi.org/10.1142/S0218495813500040

Zhang, Y., Duysters, G., & Cloodt, M. (2014). The role of entrepreneurship education as a predictor of university students' entrepreneurial intention. *International Entrepreneurship and Management Journal, 10*(3), 623-641. http://dx.doi.org/10.1007/s11365-012-0246-z

Appendix

No.	Items	Source
Perceived desirability (PD)		
PD1	I know what it takes to start a business.	Adapted from Lepoutre, Van den Berghe, Tilleuil and Crijns (2010)
PD2	I feel sure enough of myself to start my own business at some point in the future.	
PD3	If I would start my own business, it would certainly be a success.	
PD4	I am determined to start a business within the next five years.	
Perceived feasibility (PF)		
PF1	I think it would be very cool to start my own business.	Adapted from Lepoutre et al. (2010)
PF2	I would love to start my own business.	
PF3	I think my business success depends on my willingness.	Adapted from Boukamcha (2015)
PF4	Launching a new business seems to be feasible for me.	
PF5	I have confidence in my ability to achieve my business creation and ensure its completion.	
Need for achievement (NFA)		
NFA1	I would not mind routine unchallenging work if the pay was good.	Adapted from Maoto and Niekerk (2014)
NFA2	I like challenges that really stretch my abilities rather than things I can do easily.	
NFA3	I think more of the present and the past rather than of the future.	
NFA4	It is more important to do a job well than to try to please people.	
NFA5	When I am faced with a challenge, I think more about the results of succeeding than the effects of failing.	
Need for autonomy (NFB)		
NFB1	I do like to do things that are novel or unconventional.	Adapted from Maoto and Niekerk (2014)
NFB2	I like to do things in my own way without worrying about what other people think.	
NFB3	When tackling a task, I rarely need or want help.	
NFB4	Most people think I am stubborn.	

No.	Items	Source
Entrepreneurship development program (EDP)		
EDP1	I have taken entrepreneurship technology subject.	Adapted from Lame and Wan Yusoff (2013)
EDP2	I have gone through the experiential learning in the subject of entrepreneurship in my university.	
EDP3	I have undergone training in entrepreneurship organised by my university and other training providers.	
Intention to become an entrepreneur (EI)		
EI1	I am more likely to become an entrepreneur after graduation.	Adapted from Maoto and Niekerk (2014)
EI2	I am more likely to be an entrepreneur at any point in the future.	
EI5	I will become an entrepreneur based on the support from my family.	