



Impact of internship quality on entrepreneurial intentions among graduating engineering students of research universities in China

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Abstract This paper seeks to explore the relationship between the internship quality, entrepreneurial desirability, entrepreneurial feasibility and entrepreneurial intention(EI) through a structural equation model. The sample is composed of 702 graduating engineering students from two research universities within China. The results revealed that students' internship quality has positive and significant impact on their EIs. More specifically, the internship quality significantly affects students' EIs both directly and indirectly. Furthermore, entrepreneurial desirability and feasibility partially mediate the relationship between the internship quality and students' EIs. There are some substantial differences among gender subgroups, those being family characteristics and entrepreneurial experiences which were examined by the multiple group comparison test. Theoretically the findings provide new insights on the role of internships played in university students' EIs. Practically, this study highlights the importance of improving internship quality which can increase students' entrepreneurial desirability and feasibility, thereby promoting their EIs.

Keywords Entrepreneurial intention · Graduating engineering students · Internship quality · Entrepreneurial desirability · Entrepreneurial feasibility

Introduction

The idea of becoming an entrepreneur is receiving an increasing amount of undergraduates attention, because entrepreneurial activity is considered a

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valuable way to create jobs, wealth and value (Teixeira & Forte, 2015), and it is increasingly more difficult to search for employment under the handicap of excessive university graduates in job market. Thus, there is an upward trend for undergraduates take entrepreneurship as a career path (Pihie & Bagheri, 2013). Many scholars have confirmed that university students' entrepreneurial intentions (EIs) are related to their decisions to start new businesses (Bae et al., 2014) (Liñán & Fayolle, 2015). Both government policies and university education are increasingly focusing on the promotion of undergraduates' EIs, whose objective is to solve employment problems and increase social wealth through entrepreneurial activities (Ambad & Damit, 2016). For example, in recent years, China has adopted various measures to develop an 'entrepreneurial mindset' amongst undergraduates with the compulsory entrepreneurship education courses and internship programs etc. Similarly, internship programs in engineering education are vigorously promoted for cultivating student's EIs.

Much literature has demonstrated that entrepreneurship education has a positive relevance to students' EIs (Law & Breznik, 2017; Maresch et al., 2016). *However, the existing literature mainly focus on the influence of entrepreneurial education on EIs, most of these university-level entrepreneurial education programs are theoretical courses, and are insufficient for the study on the impact of the internship on EIs.* The internship is an essential part of the entrepreneurial training and education, and as a major driver in the process of developing the entrepreneurship, it plays an important role in changing students' EIs and skills. Consequently, the internship provides undergraduates with a precious opportunity to personally experience and gain practical knowledge by taking part in supervised and planned work in an authentic professional environment before graduation (Sybouts, 1968). Within China, the internship is an integral part of a bachelor's degree, without which a student would not be certified as a graduate. The internship is usually performed in the last year of university life and generally lasts 6 months. Students and their employers must countersign an internship contract and upon completion, formal reviews will be given to students by their employers and university educators. After the internship, students have to prepare for graduation and ponder what career to pursue, whether self-employment, obtaining a position in a company, or maybe a further university education. Therefore, it remains of great significance to study the impacts of the internship on graduates' EIs.

The quantitative research method is used in this study because it explains the causes of changes in social factors, primarily through objective measurement and quantitative analysis. Whereas, qualitative research is more concerned with the understanding of social phenomenon from the actor's perspectives through participating in the realistic situations of the actors. Using quantitative research, this paper measures the direct impacts of the internship quality, entrepreneurial desirability and feasibility on graduating engineering students' EIs. It also measures the impacts of entrepreneurial desirability and feasibility, as mediators with graduating engineering students, and contributes to addressing this research gap namely, the impacts of internship quality on EIs. The findings will be vitally important to policy-makers and academic institutions who are concerned with entrepreneurship promotion.

Literature review

Entrepreneurship intention

Bird (1988) argued that the EI described an entrepreneur's mind-set is directing the attention, experience and action toward starting a business. Krueger et al. (2000) and Bae et al. (2014) held a similar view. Following their definitions, the EI in this study is defined as the intention of the engineering undergraduates to engage in entrepreneurial practices after graduation. As most researches agreed that entrepreneurship could be best predicted by intentions (Botsaris & Vamvaka, 2014; Krueger et al., 2000), a growing number of entrepreneurship studies are centered on the factors and variables that explain EIs, among which entrepreneurship education (Zhang et al., 2014) (Maresch et al., 2016), attitude toward entrepreneurship (Roy et al., 2017), self-efficacy (Zhao et al., 2005) (Tsai et al., 2014), parental role models (Zapkau et al., 2015), personality traits (Pillis & Reardon, 2007) and entrepreneurial social networks (Xiao & Fan, 2013) are the important factors found to have an effect on university students' EIs. *However, in this study, the internship, entrepreneurial feasibility and desirability, which seem most relevant within the context of the current investigation, will be considered.*

Internship quality

Internship is a very important method for undergraduate entrepreneurial training because this kind of experiential learning contributes to practical application and skills development through training in a professional setting. Existing research has given considerable attention to the impact of internship programs on career choice (Ko & Sidhu, 2012). Research also shows that the internship is more significant than other learning opportunities for students to foster professional confidence (Gault & Stephens, 2000; Hecimovich & Volet, 2012), and the internship quality is closely associated with students' career development (Gamboa et al., 2014). For example, Gault and Stephens (2000) argued that undergraduate business internships have a positive and significant impact on students' career success. Therefore, there are many possible reasons why undergraduates with internship experiences have better opportunities to develop EIs. One reason may be that as one of the most important learning experiences, problem-solving skills are related to entrepreneurial competence, which students can develop from the internship (Kim et al., 2012). Moreover, students with internship experiences have a better comprehension of the real business world, providing them with higher decision making awareness as to whether they will pursue entrepreneurship (Gault & Stephens, 2000) in the final year of their university life or they make other career choices.

According to the existing research, internship quality largely influences students' overall career development and career exploration (Carless & Prodan, 2003). The indicators of the internship quality include supervisors' support, training and feedback as well as learning opportunities etc. (Gamboa et al., 2013, 2014; Liu, 2012). Studies show that the internship quality heavily depends on sufficient instructions and feedback from the supervisor (Narayanan et al., 2010) (Johari & Bradshaw, 2008). The existing literature of the internship focus on students' career choice (Ko & Sidhu, 2012) and enterprise's(employer) long-term talent pipeline for recruitment through internship programs (Griffitts, 2016) and neglect the influence of the internship on students' EIs. *Although the internship has substantial implications for university students' career*

development (Ko & Sidhu, 2012), little is known about how it affects students' EIs. Thus, this thesis aims to investigate whether internship qualities exert influences on university engineering undergraduates' EIs.

Entrepreneurial desirability and feasibility

Many studies (Krueger et al., 2000; Liñán et al., 2010) have examined the relations between students' attitude and EIs within Shapero's entrepreneurial event model (SEE) and the Theory of Planned Behavior (TPB). SEE model assumes that individual's choice to become an entrepreneur is inseparably linked with the desirability, feasibility, and the propensity to act (Shapero & Sokol, 1982). Shapero and Sokol (1982) defined the entrepreneurial desirability as personal eagerness for starting a business. Desirability is further described by Krueger (Krueger 1993) as "the degree to which one finds the prospects of starting a business to be attractive." Segal et al. (2005) argued that an individual's pursuit of self-employment as a desirable career option will be likely to develop an intention to engage in self-employment in the future. Entrepreneurial feasibility refers to 'the degree to which one feels personally capable of performing entrepreneurial activities and starting a business'(Krueger et al., 2000). Perceived feasibility can be influenced by role models, education and practice, perceived availability of resources related to entrepreneurship, one's confidence in performing entrepreneurial tasks (Gasse and Tremblay 2011).

Theory of Planned Behavior(TPB) was proposed by Ajzen (1991) who argued that the intention to start a new business was the result of one's attitude toward the creation of new ventures and the perception of feasibility and desirability of a new start-up (Sánchez, 2011). This implies that there is high feasibility/desirability to start the business, which leads to actual venture creation behavior (Adekiya & Ibrahim, 2016). Similarly, Krueger et al. (2000) suggested that entrepreneurial desirability and feasibility are the main factors affecting EIs. For example, an investigation of 719 university students by Guerrero et al. (2008), revealed that the majority of students desired to start a business much influenced by desirability and feasibility on the students' EIs. The intention to go into entrepreneurship and set up new a business depends on individual's perception of desirability and feasibility of his/her activity (Nordin et al., 2016).

According to SEE and TPB models, we argue that the entrepreneurial desirability and feasibility may mediate the effect of internship quality on EIs. Internship can be viewed from different perspectives:

- (1) by providing students with a real business world where they can experience in their future potential and thereby stimulating their entrepreneurial desirability.
- (2) by focusing on the practices of specific skills related to entrepreneurial behavior, such as promoting product design, analyzing market opportunities, communicating with supervisor and customers, making decisions within a certain range and developing social skills.

During the internship, and with the guidance of a supervisor, together with the influence of teammates and the field experience, students may have more capacity to feel confidence in business startups. Having this confidence, students' entrepreneurial desirability and feasibility can be developed with their knowledge and capability gained

from their internship. In addition, scholars have demonstrated that desirability and feasibility have a positive impact on individual's EIs (Krueger et al., 2000). Previous studies have also demonstrated that they are mediators. For example, entrepreneurial desirability and feasibility are two mediators between network heterogeneity and EIs (Xiao & Fan, 2013). Therefore, we can take desirability and feasibility as mediators. *Nonetheless, the existing literature falls short in researching the relationship among the internship quality, entrepreneurial desirability and feasibility and EIs. In conclusion, the influence of desirability and feasibility on the EI to start a new business based on different internship qualities will be analyzed in this study.*

Conceptual models and hypotheses

Figure 1 shows the hypothesized structural model for the possible influence of the internship quality on students' EIs and measures the impacts of entrepreneurial desirability and feasibility as mediators. In addition, according to the existing researches, demographic variables such as gender, family background and entrepreneurial experiences may affect EIs. Thus the aforementioned variables are analyzed. After the preliminary investigation of the current status of entrepreneurship intentions among 150 graduates in Zhejiang University, the following four hypotheses are formulated.

The first hypothesis in this study is to confirm the relationship between the internship quality and students' EIs.

H1: The internship quality has a positive effect on EIs.

The second hypothesis deals with the relationship among the internship quality and entrepreneurial desirability and feasibility. It is thus hypothesized that the internship quality are positively correlated with students' entrepreneurial desirability and feasibility.

H2a: The internship quality has a positive effect on entrepreneurial desirability.

H2b: The internship quality has a positive effect on entrepreneurial feasibility.

The third hypothesis deals with the relationship among entrepreneurial desirability and feasibility and EIs. It is thus hypothesized that the entrepreneurial desirability and feasibility are positively correlated with students' EIs.

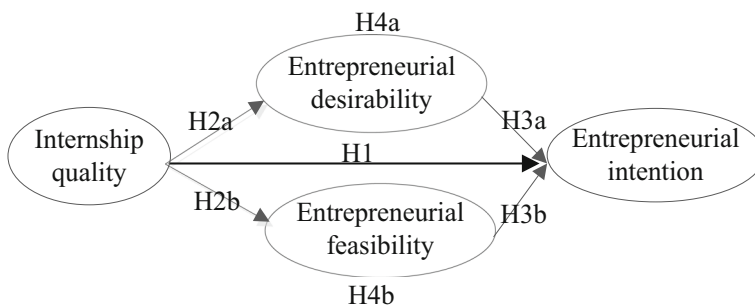


Fig. 1 Research framework

H3a: Entrepreneurial desirability has a positive effect on EIs.

H3b: Entrepreneurial feasibility has a positive effect on EIs.

The fourth hypothesis deals with the mediating role of entrepreneurial desirability between the internship quality and EIs, entrepreneurial feasibility between the internship quality and EIs. It is thus hypothesized that the entrepreneurial desirability and feasibility are mediators.

H4a: Entrepreneurial desirability mediates the positive effect of internship quality on EIs.

H4b: Entrepreneurial feasibility mediates the positive effect of internship quality on EIs.

Methods

Participants and data collection

This study randomly selected 760 samples of senior engineering undergraduates from two research universities i.e. Zhejiang University and Shanghai Jiao Tong University, both of which rank the 3rd and 6th in the 2016 Shanghai Ranking of China. By the end of December, 2016, the number of undergraduates in Shanghai Jiao Tong University and Zhejiang University had reached 16,195 and 24,133 respectively, among them there are nearly 4000 and 6000 graduates (senior students). Both universities have engineering as their main discipline, the 760 samples were randomly selected from the discipline of the two universities. The primary data collection for variables was undertaken online through a structured questionnaire. We requested the students' supervisor to send the URL of the questionnaire to their QQ or We Chat group on their respective classes. It was convenient for students to respond on their cell phones or laptops. The questionnaires were sent out on March 2nd, 2017 and collected on March 24th. A total of 702 valid responses from students with internship experiences were collected, a valid response rate of 92.4%, meeting the research requirements. The 702 participants, 371 from Zhejiang University and 331 from Shanghai Jiao Tong University, were graduating engineering students in the final year of studying in their university, which means they are facing imminent career decisions, so it was essential that they complete the 6 months internship program starting from the previous semester. The 702 valid responses consist of 404 males (57.5%) and 298 females (42.4%). It was found from the responses that 296(42.2%) students' families have entrepreneurial background, and 106(15.1%) students had entrepreneurial experiences. Features from the samples conform to the requirements of the research. The majority of students completing the questionnaire were from small and medium enterprises.

Measures

The independent and dependent variables instruments, EIs, the internship quality, entrepreneurial desirability and entrepreneurial feasibility are mainly adopted from the existing scales. The full questionnaire is available in the [Appendix](#). All items were

measured by a five-point Likert scale ranging from ‘strongly disagree’(1) to ‘strongly agree’ (5). All items are as shown in Table 1.

EIs served as the main outcome variable in this study which was measured by five items based on the studies of Kolvereid (1996), Liñán and Chen (2009) and Law and Breznik (2017).

The measurement of the internship quality in this study was finalized by four items developed from the Internship Quality Inventory by Gamboa et al. (2014), Kim et al. (2012) and Renganathan et al. (2012). They were based on the dimensions of the support of the internship organization, the instructions of the supervisor and the intern’s satisfaction of students regarding the effectiveness of their internship programs.

Entrepreneurial desirability and entrepreneurial feasibility were measured by three items respectively, with six items in total, all of which were adopted from the widely used scales (Liñán & Chen, 2009) (Xiao & Fan, 2013).

Data analyses

Measurement model analysis

The validity of the measurement from the model was assessed to ensure the instrument quality by the structural equation model (SEM) with AMOS 24.0. Firstly, the confirmatory

Table 1 Confirmatory factor analysis for the measure model

Constructs/items/labels	SFL	CR	AVE
Internship quality(IQ)		0.893	0.680
Provided maximum opportunity for training	0.832***		
Before starting a new task, my supervisor showed how to do it	0.640***		
Offered feedback about my job performance	0.891***		
After this internship, I better understand how to become an entrepreneur	0.907***		
Entrepreneurial desirability(ED)		0.899	0.749
How desirable it is for me to become an entrepreneur	0.881***		
How tense I would be about running a business	0.848***		
How enthusiastic I would be about running a business	0.867***		
Entrepreneurial feasibility(EF)		0.896	0.742
How hard do you think it would be	0.866***		
How certain of success are you	0.842***		
How sure of yourself?	0.876***		
Entrepreneurial intentions(EI)		0.870	0.575
My professional goal is to become an entrepreneur	0.853***		
I will make every effort to start and run my own firm	0.728***		
I am determined to create a firm within five years after graduating from the university	0.779***		
I have thought of starting a firm very seriously	0.622***		
Among various options, I would rather be an entrepreneur	0.791***		

$N = 702$; SFL = Standardized factor loading. CR = Composite reliability; AVE = Average variance extracted

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

factor analysis (CFA) was conducted to assess the items' reliability and convergent validity (Anderson & Gerbing, 1988). The next step was to measure the fit and the path coefficients of this model by performing SEM analysis. As show in Table 1, the composite reliability (CR) of the constructs ranged from 0.87 to 0.90 and exceeded the suggested benchmark of 0.60 (Bagozzi & Yi, 1989). This confirmed the internal consistency reliability. The items' factor loadings ranged from 0.62 to 0.91 significant in themselves (all $p < 0.001$), while the average variance extracted (AVE) values of the constructs ranged from 0.58 to 0.75. These were above the acceptable threshold of 0.50 (Fornell & Larcker, 1981), but provided reasonable evidence of the convergent validity. Additionally, Table 2 shows that the square roots of the AVE are higher than the values of its corresponding rows and columns, providing the support for the discriminative validity (Fornell & Larcker, 1981) (Hair et al., 2010).

Both the Chi square statistic and other fit indices indicate that the measurement model received a good fit to the sample data, because all the indicates including $\chi^2 = 278.37$, $df = 84$, $\chi^2/df = 3.31 < 5$. GFI = 0.95, AGFI = 0.92, CFI = 0.97, IFI = 0.97 and TLI = 0.96 are greater than 0.90, and RMSEA = 0.057 < 0.08, SRMR = 0.04 < 0.08 (Hair et al., 2010).

Hypothesis testing

Before any conclusion is drawn for hypothesis testing, the model must fit the data well. By running the structural model in AMOS 24.0, the goodness-of-fit indices demonstrated the satisfactory model fit ($\chi^2 = 328.07$, $df = 85$, $\chi^2/df = 3.86 < 5$. GFI = 0.94, AGFI = 0.91, CFI = 0.96, IFI = 0.96, TLI = 0.95), all of these indicators are greater than 0.90, and RMSEA = 0.064 < 0.08, SRMR = 0.067 < 0.08 (Hair et al., 2010). Then, this study tested the hypothesis in this model with results are shown in Fig. 2. According to the standardized path coefficients in the research model, the hypothesis testing results demonstrate that H1, H2a, H2b, H3a and H3b are all supported at a 0.001 significance level. The findings also show that entrepreneurial desirability and feasibility partially mediate the relationship between the internship quality and EIs because all the correlations between the variables were significant ($p < 0.001$). Furthermore, the bootstrap test was performed at a 95% confidence interval with 5000 bootstrap samples (Taylor et al., 2008) for investigating the indirect effects of the dependent variables through the mediators. As is shown in Table 3, the results of the bootstrap test confirmed the existence of a positive and significant mediating influence on entrepreneurial desirability between the internship quality and EIs (standardized indirect effect = 0.091, $P < 0.001$), and positive and significant mediating effect on entrepreneurial feasibility

Table 2 Discriminant validity of the measurement model

	AVE	EF	ED	EI	IQ
EF	0.742	0.861			
ED	0.749	0.558	0.865		
EI	0.575	0.618	0.452	0.758	
IQ	0.680	0.394	0.444	0.463	0.825

N = 702; Bold numbers are the square root of the AVE of each construct. Off diagonals are Pearson correlation of constructs

between the internship quality and EIs (standardized indirect effect =0.122, $P < 0.001$). Hypotheses H4a and H4b are thus supported.

Group comparison test

The purpose of group comparisons is to evaluate whether the path coefficients are different across the subgroups of different genders, family characteristics and entrepreneurial experiences, which possibly have different effects on EIs. This study adopted the analytical strategy of Wu and Chen (2015) and to examine the existence of the multiple group difference in the structural model. The results of the test are presented in Tables 4, 5 and 6.

Gender effect

The comparative results between female and male students are present in Table 4. It is found that the two path coefficients are different in the χ^2 test which deals with the impact of ‘EF’ on ‘EIs’ ($p < 0.05$) and ‘IQ’ on ‘EIs’ ($p < 0.01$). However, the differences in the impact of other variables are not statistically significant. The relationship between ED and EIs, the female group (0.321***) has more positive and obviously higher path coefficients than male group’s (0.118*). This difference shows that, for the female engineering students, the perceived ED has stronger impact on their EIs. The relationship between IQ and EIs shows that the male group (0.333***) has positive and obvious higher path coefficients than female groups’ (0.151*). This difference indicates that, for the male engineering students, the perceived IQ has stronger impact on their EIs.

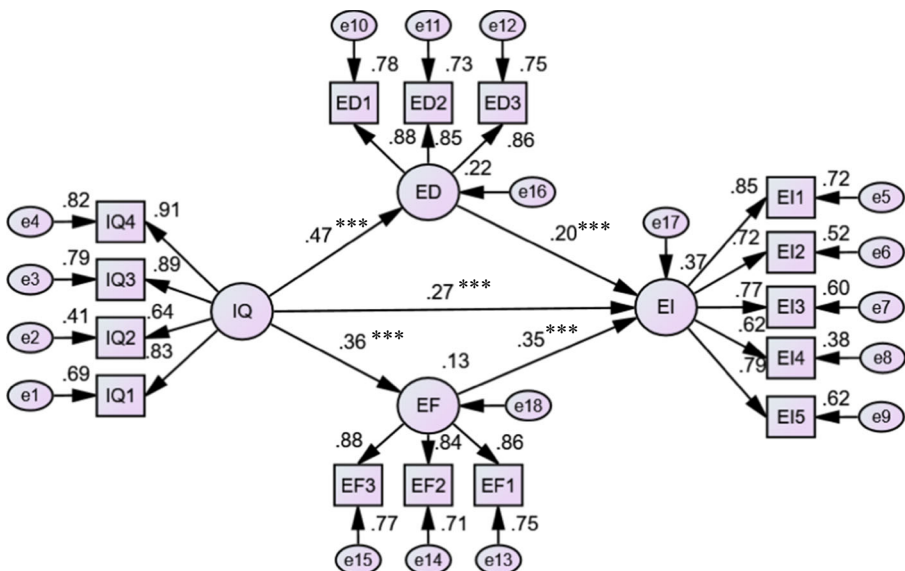


Fig. 2 Standardized estimates of path coefficients of the SEM model

Table 3 Summary of the standardized direct, indirect and total effects in this model

	Point estimate	Product of coefficients SE z		Bootstrapping 5000 times 95% CI					
				Bias-corrected percentile		Percentile		Two-tailed significance	
				Lower	Upper	Lower	Upper		
Standardized direct effects									
Internship quality--> EI	0.262	0.049	5.347	0.165	0.356	0.165	0.356	0.000***	
Standardized indirect effects									
Internship quality--> Entrepreneurial desirability--> EI	0.091	0.022	4.136	0.050	0.137	0.050	0.137	0.000***	
Internship quality--> Entrepreneurial feasibility--> EI	0.122	0.022	5.545	0.083	0.167	0.083	0.167	0.000***	
Total standardized indirect effect	0.213	0.028	7.607	0.164	0.275	0.162	0.274	0.000***	
Total standardized effect	0.476	0.047	10.128	0.383	0.567	0.383	0.567	0.000***	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

The effect of family characteristics

The results between the groups are compared with different family characteristics, that is, those students' family with entrepreneurship and non-entrepreneurship traits. The definition of "family characteristics with entrepreneurship" for the purpose of this study is that at least one member of a student's family, which includes relatives, is an entrepreneur. As is shown in Table 5, one path coefficient is significantly different in the χ^2 which tests the impact of 'IQ' on 'EIs' ($p < 0.01$). And the students group with non-entrepreneurial family characteristics (0.356***) has more positive and obviously higher path coefficients than entrepreneurial family characteristics group's (0.170*). This difference shows that, for engineering students with this kind of family characteristics, the internship plays a virally important role in their EIs. A possible explanation is that they lack the opportunities to perceive the entrepreneurship compared with the students with entrepreneurial family background. Therefore, internship serves as a very important method for students with the non-entrepreneurial family characteristics to learn about the real business world and develop entrepreneurial desirability and feasibility. Furthermore, the relationship

Table 4 Results of the multi-group comparison test in gender subgroups

Path	Male group	Female group	Subgroup comparison (Unconstrained $\chi^2 = 794.38, df = 255$)			
	Standardized coefficient		Constrained χ^2 (df = 256)	χ^2 difference	P	Result
ED < ---IQ	0.463***	0.491***	795.329	0.949	0.330	No difference
EF < ---IQ	0.368***	0.365***	794.702	0.323	0.570	No difference
EI < ---ED	0.118*	0.321***	797.049	2.669	0.102	No difference
EI < ---EF	0.378***	0.304***	799.275	4.896	0.027	*
EI < ---IQ	0.333***	0.151*	801.276	6.896	0.009	**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 5 Results of the multi-group comparison test in different family characteristics subgroups

Path	Family characteristics with entrepreneurship Standardized coefficient	Family characteristics with nonentrepreneurship	Subgroup comparison (Unconstrained $\chi^2 = 797.302, df = 255$)			
			Constrained χ^2 (df = 256)	χ^2 difference	P	Result
ED < ---IQ	0.439***	0.498***	797.543	0.241	0.623	No difference
EF < ---IQ	0.366***	0.358***	797.304	0.002	0.961	No difference
EI < ---ED	0.252***	0.152**	797.655	0.354	0.552	No difference
EI < ---EF	0.410***	0.300***	797.658	0.356	0.551	No difference
EI < ---IQ	0.170*	0.356***	805.168	7.867	0.005	**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

between EF and EIs shows that the group with entrepreneurship family characteristics (0.410***) has a more positive and higher path coefficients than the group with non-entrepreneurship family characteristics (0.300***). This difference shows that, for the engineering students with entrepreneurial family characteristics, the perceived EF may have a stronger impact on their EIs.

The effect of individual entrepreneurial experience

Similarly, differences in the model comparing students with entrepreneurial experiences and non-entrepreneurial experiences are also tested. Students' entrepreneurial experiences refer to start-ups and other businesses they themselves created. The results are shown in Table 6, in which the effects of entrepreneurial feasibility on EIs are confirmed to differ according to the entrepreneurial experiences. Although they both have a positive and significant impact of EF on EIs, the path coefficient of the students with entrepreneurship experiences (0.738***) is much higher than the student with non-entrepreneurship experiences (0.291***) between EF and EIs.

Table 6 Results of the multi-group comparison test in different individual entrepreneurial experience subgroups

Path	Student with entrepreneurship experience Standardized coefficient	Student with non-entrepreneurship experience	Subgroup comparison (Unconstrained $\chi^2 = 798.833, df = 255$)			
			Constrained χ^2 (df = 256)	χ^2 difference	P	Result
ED < ---IQ	0.424***	0.480***	798.853	0.020	0.887	No difference
EF < ---IQ	0.466***	0.336***	799.559	0.726	0.394	No difference
EI < ---ED	0.043	0.200***	800.627	1.794	0.180	No difference
EI < ---EF	0.738***	0.291***	818.028	19.195	0.000	***
EI < ---IQ	0.088	0.297***	801.625	2.792	0.095	No difference

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Discussion

The findings of this study provide empirical evidence for the hypothesized relationship in Chinese research universities (see Fig. 2, Table 3). Firstly, this study specifically confirmed that the internship quality has a positive and significant effect on EIs of engineering undergraduates. Entrepreneurial desirability and feasibility also have significant and positive effects on students' EIs respectively, to become an entrepreneur. Secondly, both entrepreneurial desirability and entrepreneurial feasibility partially mediate the relationship between the internship quality and students' EIs respectively. Finally, the group comparisons reveal that some path coefficients are different across the subgroups of different genders, family characteristics and entrepreneurial experiences, which explains that the constructs have different effects on students' EIs (details show in Tables 4, 5, 6).

Theoretical implications

The findings of this study have three main theoretical implications. Firstly, this study provides new insights on the role of internships in university students' EIs. Previous studies have concentrated on the role of the internship in graduates' career choice and enterprises' recruitment. However, this study develops and examines the model that integrates the four factors, i.e. the internship quality, entrepreneurial desirability and feasibility and EIs. It is the first to examine specifically the direct and indirect impacts of the internship quality, entrepreneurial desirability and feasibility on engineering graduates' EIs. Thus its main contribution is that this model can be used to assess the influences of the internship quality on university students' EIs and career development based on engineering education data within China.

Secondly, the conclusions of this study extend the work of Krueger et al. (2000) as well as Adekiya & Ibrahim's research (2016) by examining entrepreneurial desirability and feasibility as mediators of the impact of internships on students' EIs. More specifically, it is the first work that examines the mediating roles of both entrepreneurial desirability and feasibility in the relationship between internships and EIs of the university engineering graduates. The results are consistent with the TPB (Ajzen, 1991), which implies that high feasibility/desirability of business startups will actually tend more to create a venture. Meanwhile, the results of this study will contribute to the research by taking entrepreneurial desirability and feasibility as variables that connect the internship with the TPB in the context of university students.

Finally, this study provides additional and detailed evidence for the positive effects of the internship quality on university students' EIs, the impact of entrepreneurial desirability and feasibility as mediators on the EIs. The results further reveal that these constructs possibly have different effects on EIs among different genders and family characteristics as well as subgroups with entrepreneurial experiences. The impacts of 'EF' on 'EIs' and 'IQ' on 'EIs' have respectively found differences between the female and male group. It is also found that the impact of 'IQ' on 'EIs' is at variance in groups with different family characteristics, thereby revealing that internship could exert more influence on the students' EIs with non-entrepreneurial family characteristics. The test results of the effects of students' entrepreneurial experiences on their intentions show that entrepreneurial experiences are very important for fostering EIs.

Practical implications

This study also has two important practical implications for policy makers and academic institutions that are concerned with university students' entrepreneurship.

It is important for universities to learn more about the relationship that may exist between internship quality and students' EIs according to the results of this study. It is thus advised that universities should take more efficient measures and actions to improve students' internship quality. To do so, firstly, educators should encourage students, especially those who do not have entrepreneurial family characteristics and entrepreneurial experiences, to take an active part in the internship program. It is also necessary to strengthen the management of the process of the internship to improve its quality, because the internship is usually administered outside the university where teachers' supervision is lacking. Secondly, universities should provide a real work environment through strengthening the cooperation with government and enterprises, rather than emphasizing on traditional theory study in the classroom. Finally, universities should provide students with more entrepreneurship opportunities, because students' entrepreneurial experiences significantly enhance their entrepreneurial feasibility and thereby enhance their EIs according to the results of this study. For example, the two investigated universities, Shanghai Jiao Tong University and Zhejiang University, provide free placements and start-up funds for students' entrepreneurial activities by using the resource from the university science and technology park, student business park, university-enterprise cooperation center etc.

The model in this study is especially important for government departments and industries because the university students' internship programs are not conducted without the support of them. On the one hand, the government should make the incentive policies to further prompt cooperation between universities and enterprises to improve the internship quality. For example, the government could give more preferential policies in land, taxation, personnel recruitment, foreign capital injection and technology for the enterprises to provide high quality internship opportunities. On the other side of the equation, enterprises should manage improvement the internship quality. According to the results of this study, in order to improve the internship quality, it is important that internship institutions take responsibility for the assignments, maximise opportunities for training and real job experiences (Gamboa et al., 2014). Meanwhile, supervisors should offer sufficient feedback regarding the internship performances and discuss the career development with the trainees (Narayanan et al., 2010), which would greatly help internship students to better understand the possible challenges at their career start by learning how to become an entrepreneur.

Conclusion

A model composed of four factors and five paths provides a clear picture (see Fig. 2) of how to better foster university students' EIs through internship programs with the mediating effects of entrepreneurial desirability and feasibility. The results demonstrate that the internship quality has a positive effect on student's EIs, entrepreneurial desirability and feasibility partially mediate the relationship between internships and EIs. Therefore, this study also provides

better systematic understanding of the mechanism in which the internship quality impacts undergraduate's career choice to become an entrepreneur. The results have essential implications for the universities, government and enterprises seeking to improve the internship quality and enhance student's entrepreneurial desirability and feasibility, and thereby prompt students to start a business. The results have made a significant contribution and stimulated further interest in the study of the relationship between internships and EIs. For example, further study could explore the internship quality's impact on EIs through other hypothesized mechanisms such as the collaboration mechanism of internships between universities and internship institutions. In addition, further research should examine the derived structural model presented in this study as to verify whether it can explain entrepreneurial behavior of students with majors other than engineering students. In particular, longitudinal studies also can be implemented to investigate whether university engineering students with EIs will actually establish their own businesses after graduation.

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Appendix

Questionnaire

Indicate your level of agreement with the following statements from 1 (total disagreement) to 5 (total agreement)

Internship quality(IQ)

- (1) Provided maximum opportunity for training
- (2) Before starting a new task, my supervisor showed how to do it
- (3) Offered feedback about my job performance
- (4) After this internship, I better understand how to become an entrepreneur

Entrepreneurial desirability(ED)

- (1) How desirable it is for me to become an entrepreneur
- (2) How tense I would be about running a business
- (3) How enthusiastic I would be about running a business

Entrepreneurial feasibility(EF)

- (1) How hard do you think it would be
- (2) How certain of success are you
- (3) How sure of yourself?

Entrepreneurial intentions(EI)

- (1) My professional goal is to become an entrepreneur
- (2) I will make every effort to start and run my own firm
- (3) I am determined to create a firm within five years after graduating from the university
- (4) I have thought of starting a firm very seriously
- (5) Among various options, I would rather be an entrepreneur

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