

The attitude of Graduation Students towards the Engineering Education: Mediating Role of Financial Condition

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Abstract:

The purpose of the study is to examine the attitudes of university students of Thailand towards engineering education and the mediating role of financial condition. The attitude of the graduation students consists upon their personal interest, parent's intentions and job opportunities available in the market and this study take all these factors as predictor and financial condition as a mediator of the study. The students of graduation who selected the engineering education were the respondent of the study. Data were collected by personal visit to the public sector universities of Bangkok, Thailand. This study was used the PLS-SEM for the analysis of the data. The results showed that positive association among the attitudes of the student such as personal interest, parent's intentions and job opportunities with engineering education. The results also highlighted that financial condition of the student mediates the relationship among all the predictors (personal interest, parent's intentions and job opportunities) and dependent variable (engineering education) of the study. This study suggested to the policymakers that they should focus on the attitudes of the students in selecting the engineering education and also provides them financial assistant that should enhance the interest of the students towards engineering education.

Keywords: Engineering Education, Personal Interest, Parent's Intentions, Job Opportunities, Financial Condition

I. INTRODUCTION

Education is playing a vital role in the development of any country in the world. It can explore the modern and innovative ways of thinking and development of the world. There is no improvement and development in any field can be possible without education. No country can be succeeded without the adoption of effective practices of engineering in this modern world. Thus, education is the only way to enhance the innovation, development, and improvement of every sector of the world. Similarly, engineering education is also one of the vital parts of the education that explore the different ways of thinking and development. This is one of the foremost requirement of modern society of the world and without this education innovation and development are not possible. The requirement of this education is necessary for all the sector of

the economy of the world, such as banking, agriculture, automobile, health sector, marketing, and education.

There is a strong link between the agriculture and engineering filed due to advancement in this sector of the economy. The magnitude of the relationship among the agriculture and engineering leads to develop the new field of engineering that is called agricultural engineering that deals one of the branches of engineering and this branch deals with the take care and development of agriculture related outputs and affairs. In these days almost all the formers are using the agriculture machines that increase the rate of the production in the agriculture sector of the country and also save the time of the farmer (Singh, 2017). This is the output of engineering field for the agriculture sector that has promoted the agriculture practices all over the world. In addition, farmers used the different kinds of seeds and fertilizers for different types of crops, and these seeds and fertilizers are the output

of chemical engineers. The effective work of chemical engineers generated the effective production of chemical reactions that is helpful for the crops to increase its production level. In most of the countries, a long duration of dry season affected the output of the agriculture sector because there is no rainfall in the country, but the supply of agricultural products are needed to the market for the fulfilling the demand of the customers (Yu, Bretherton, & Buchanan, 2013). Thus, how we can available the agricultural products to the market in this dry season that affected the outcome of agriculture? Drilling engineers are provided the solution to this problem that they generate the water by beneath the ground and make the products available in the market. The irrigation system is the solution to the problem that provides the water to keep the products growing and available in the market.

The engineering is also playing a fundamental role in the banking sector of the world. Many of the engineers are providing their services in the banking sector of the economy because without the engineers; banks cannot adequately be functioned. The banks are now demanding the services of network and software engineers to make the functions of the banks more unique and advance. The engineering has added the quality services in the functions of the banks that they render to the customers such as manual counting of the cash is difficult, error-based and time-consuming activity of the banks but nowadays banks using the cash counting machines that is the output of the field of engineering that reduce the time, errors and simplify the counting process. Another invention of the engineering is the computer that also reduces the time, error and simplifies the work of the banking sector then the manual banking that is full of error, time-consuming and difficult to handle (Sulaiman & Kassim, 2011). The software developed by the software engineers is reduced the error level in the banking sector and also joint the different branches even different banks at one platform. They can easily share their data, transactions and other banking related works in a few seconds. These software helps to keep the record of hundreds of year that was impossible in case of manual banking. These are all outputs of engineering education for the development of banking sector of the world (Daniels, Cajander, Pears, & Clear, 2010).

The automobile is one of essential outputs of the engineering education that helps the people to move from one place to another with ease and in no time. This idea generated by the engineers and very successful in their idea and now it is acceptable all over the world. Automobile includes cars, bike, and other transports that move the people from one place to another. These products are a combination of the activities of many types of engineers such as metallurgical engineers and material engineers (Rao, 2014). The efforts of metallurgical

engineers were about to develop a decent quality-oriented alloys for the engines that are the output of convenient costing processes such as investment casting process. Moreover, the gear and piston are the two essential products of that casting process carried by the metallurgical engineers. This engineering field updated with the passage of time and also change the model of the automobile according to the requirement of the changing society (Hoffmann & Leimeister, 2011). Previously people using the oldest model of the automobiles such as Honda 2008 model and nowadays people are using Honda 2018 model with advanced features that are the advancement in the field of engineering. This advancement of the engineering field provides the latest versions to the society that is the requirement of changing world. Thus, the engineering education is very important for the development and improvement of almost all of the sectors of the economy of world and needs to put extra intentions of this education to promote it in the new generation of the world.

The trend of engineering education is also increasing in the universities of Thailand. Figure 1 given below highlighted the increasing trend of engineering education in Thailand. According to these figures, 1,300 engineering education institutions were registered in 2007-08 after that a shortfall has been observed in these education institutions and around 843 engineering educations were left in 2008-09. Moreover, after 2008-09 increasing trend has been observed in the engineering education institutions. The engineering education institutions were reached to 1,243 by the end of 2009-10 that was highest increase in the engineering education institution that represents about 50 percent increase. In addition, with 25 percent further increase in engineering education institution, the number of institutions reached at 1,683 in 2010-11. Furthermore, after that a slight increase has been observed, and the institutions are increasing to 1,891 in 2011-12 with only 17 percent increase. Additionally, the engineering education institutions were reached at 1,935 with a very slight rise in 2012-13. This increasing trend of engineering education institutions highlighted that the focus of the government and policymakers on the promotion of engineering education for the development of all the sector of the country.

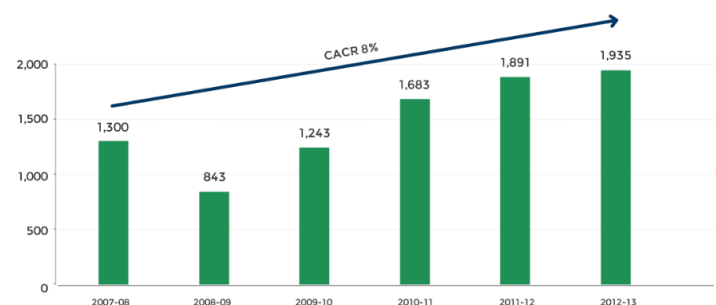


Figure 1
The trend in Engineering Education in Thailand

The institution of engineering education increasing day by day but it cannot produce the best engineers for the economy. According to the Table 1 given below mentioned the 50 countries that produce the top-class engineers for the country, but Thailand does not exist among these 50 countries. According to the list below, China is at top in providing the quality engineers for the country with score index 100. In addition, Russia is at second position in producing the quality engineers for the country with score index 99.9. Moreover, Poland is at third position in producing the quality engineers for the country with score index 98.0. Furthermore, Switzerland is at fourth position in producing the quality engineers for the country with score index 97.9. Similarly, Hungary is at fifth position in producing the quality engineers for the country with score index 93.9. Likewise, Japan is at sixth position in producing the quality engineers for the country with score index 92.1. Additionally, Taiwan is at seventh position in producing the quality engineers for the country with score index 91.2. In addition, France is at eighth position in producing the quality engineers for the country with score index 91.2. Moreover, Czech Republic is at ninth position in producing the quality engineers for the country with score index 90.7. Furthermore, Italy is at tenth position in producing the quality engineers for the country with score index 90.2. Finally, Pakistan is at fiftieth position in producing the quality engineers for the country with score index 57.4.

Table 1
Ranking of the Country According to Best Engineers

Rank	Country	Score Index	Rank	Country	Score Index
1	China	100.0	26	Netherland	78.9
2	Russia	99.9	27	Chile	78.4
3	Poland	98.0	28	United State	78.0
4	Switzerland	97.9	29	United Kingdom	77.7
5	Hungary	93.9	30	Turkey	77.5
6	Japan	92.1	31	India	76.0
7	Taiwan	91.2	32	Ireland	75.9
8	France	91.2	33	Mexico	75.7
9	Czech Republic	90.7	34	Denmark	75.6
10	Italy	90.2	35	Israel	74.8
11	Ukraine	88.7	36	Norway	74.6
12	Bulgaria	87.2	37	Portugal	74.2
13	Singapore	87.1	38	Brazil	73.4
14	Germany	84.3	39	Argentina	72.1

15	Finland	84.3	40	Indonesia	71.8
16	Belgium	84.1	41	New Zealand	71.6
17	Hong Kong	83.6	42	Egypt	69.3
18	Spain	83.4	43	South Africa	68.3
19	Australia	83.2	44	Bangladesh	67.8
20	Romania	81.9	45	Colombia	66.0
21	Canada	81.7	46	Philippines	63.8
22	South Korea	81.7	47	Malaysia	61.8
23	Vietnam	81.1	48	Nigeria	61.3
24	Greece	80.8	49	Sri Lanka	60.4
25	Sweden	79.9	50	Pakistan	57.4

According to the above figures, Thailand is not producing quality engineers for the country that is the major fault of the institutions. The engineering education is essential for the improvement of every sector of the economy in the country and the institutions of Thailand are increasing to produce the engineers for the society, but it does not provide the quality engineers for the society that is the lacking on the hand of institutions. Thus, this study takes the engineering education as the primary variable, and the attitude of the graduation students consist upon their personal interest, parent's intensions and job opportunities available in the market and this study take all these factors as predictor and financial condition as a mediator of the study.

II. LITERATURE REVIEW

The literature about the association among the constructs and operational definition of the constructs used in the study are explained in the following sub-sections:

Engineering Education

It refers to the activity of principles, of professional practices about engineering and the teaching knowledge that enhance the education of engineering in the university students (Desha & Hargroves, 2010). Moreover, "engineering education is the activity of teaching knowledge and principles to the professional practice of engineering. It includes an initial education (bachelor's and master's degree), and any advanced education and specializations that follow. Engineering education is typically accompanied by additional postgraduate examinations and supervised training as the requirements for a professional engineering license" (Borrego, Froyd, & Hall, 2010). In addition, the knowledge of engineering that are transferred to the engineering student by the institutions to generate new engineers for the country (Violante & Vezzetti, 2014). Furthermore, "the degree in technology and

engineering prepares students to teach technology, engineering, or vocational subjects in middle schools, high school, or trade and technology education centers. The program provides hands-on learning opportunities for students to gain the technical expertise”(Singer & Smith, 2013). Similarly, engineering education is the skills of the engineering that is taught in the education institutions that has different kind such as aeronautical engineering, electrical engineering, mechanical engineering and electrical engineering(Prados, Peterson, & Lattuca, 2005). Likewise, “engineering the profession of applying scientific principles to the design, construction, and maintenance of engines, cars, machines, etc. (mechanical engineering), buildings, bridges, roads, etc. (civil engineering), electrical machines and communication systems (electrical engineering), chemical plant and machinery (chemical engineering), or aircraft (aeronautical engineering)”(Johri & Olds, 2011). Thus, engineering education is necessary for the development of almost all the sector of the country, and this study used this variable as main or dependent variable of the study.

Personal Interest

It means the interest of students regarding the selection of any subject while studying in the institutions. Moreover, “the personal interests that you work into a resume should be relevant in some way to the skills and abilities you’ll need to perform your new job. That can’t be emphasized enough! The large majority of job ads do not require applicants to list personal interests on a resume, so don’t feel like you have to” (Vermeulen, Henneman, van El, & Cornel, 2013). In addition, personal interest refers to the interest of the individual according to the ability, skills, and experience that he or she has and on the basis this interest he or she will select the subject in the university education(Vittersø & Søholt, 2011). Furthermore, “an interest assessment can help you identify careers that meet your interests. Interest assessments usually ask you a series of questions about what you like and don’t like to do. Then they match your likes and dislikes to careers. When you choose a career that matches your overall interests, you’re more likely to enjoy your job” (Woodcock, Middleton, & Nortcliffe, 2012). For Example “Your interest is tutoring school children in math, and you are applying for a teaching position. You have a personal interest in home cooking, and you are applying for a job in a restaurant. You have a personal interest in cars, and you are applying for a job at a car dealership, and you have a personal interest in engineering education, and you are selecting the engineering subject for your course work in the university”. Thus, the personal interest is necessary for the

selection of the subject at university level. If the student interested in subject then he or she will survive in the education and in professional field and this study used as independent variable.

Parent’s Intentions

Parent’s intentions refer to the willingness to do or want to do for their children in any field of life. Their intentions always have value in selecting anything in the life of their children. Moreover, “an act or instance of parents in determining mentally upon some action or result, the end or object intended; purpose. Intentions, purpose or attitude toward the effect of one’s actions or conduct: a bungler with good intentions” (Roda & Wells, 2012). The intentions of the parents refer to the interest of the parents that change the children decisions in respect of selecting the course work at the university level. In addition, “agreements made between parents and children to support students by parents at university and other situations can be classed as an intention to create legal relations. For such an agreement to be a contract there needs to be something much more formal, such as a deed (a formal written and witnessed document) (Turner, Jensen-Doss, & Heffer, 2015). Furthermore, the intention of the parents means the influence of the parents on the children in selecting anything in life either in the education or any other field of life(Lindley et al., 2016). Additionally, this means that the parents will determine the arrangement that best suits the child’s needs, based on a variety of factors. The factors the parents consider will vary depending on the situation; different situation has different set of mind in selecting the things (Baker et al., 2013). Thus, the parents’ intentions are necessary for the selection of the subject at university level. If the parents and students both interested in subject then he or she will survive in the education and in professional field and this study used as independent variable.

Job Opportunities

Job opportunities refer to the availability of the job in the market that a candidate is searching at the time of its need. Moreover, “the new job opportunities could allow people to become more and join the institution” (Maddux, Bivolaru, Hafenbrack, Tadmor, & Galinsky, 2014). In addition, “employment is an agreement between an employer and an employee that the employee will provide certain services on the job. The employment agreement ensures that: An employment agreement for an individual employee can be verbal, written in an email, or it can be a job offer letter”(Redcross, Millenky, Rudd, & Levshin, 2011).

Additionally, job opportunities refer to the opportunities that are available in the market to earn money for job seekers (Zacher & Frese, 2011). Similarly, job opportunities mean the job offers by the company to the job seekers in return for some salary. Likewise, it refers to the chances of earning given by the organization to the job seekers of the country (Sommer & Kulkarni, 2012). Thus, the job opportunities are necessary for the selection of the subject at university level. If the job opportunities of a particular subject are available then the student will try to survive in that subject and this study used as independent variable.

Financial Condition

Financial condition refers to the status of the person, firm, or institutions about the assets and liabilities at a specific date. Moreover, "the status of the assets, liabilities, and owners' equity (and their interrelationships) of an organization, as reflected in its financial statements. Also called the financial condition" (Kostyukova, Yakovenko, Germanova, Frolov, & Grishanova, 2017a). In addition, financial condition means the ability of the person and firm to pay their debts on a particular date (Bialowolski & Weziak-Bialowolska, 2014). Furthermore, it means "financial conditions indexes can serve as a barometer of the health of financial markets. The burst of the housing bubble and subsequent financial crisis led to the worst recession since the great depression" (Linsmeier, 2011). Similarly, financial condition is defined as the position of financial well-being about the individual and company and also important for every single business (Swiderski, Kurek, & Osowski, 2012). Likewise, "financial conditions tightened despite the aggressive easing of monetary policy during this period. There are many explanations for why the relationship between the federal funds rate and financial conditions is so variable. Without being exhaustive, let me highlight three" (Pande & Jain, 2014). Thus, the financial condition is necessary for the selection of the subject at university level. If the financial condition is strong of the students and his or her family then there are strong chances to survive in the education too, and this study used the financial condition as mediating variable.

Personal Interest and Engineering Education

The success of engineering education depends upon the personal interest of the student. If the student is interested in engineering education then the output of the education will be perfect for the country and vice versa (Becker & Park, 2011). Moreover, a study conducted by Wang, Xia, and Li (2011) on engineering education and found positive association between personal interest and engineering education of the students. In addition, the selection of engineering education depends upon

the personal interest of the students. If the student is interested in engineering education then they select and perfectly perform in engineering education and vice versa. Similarly, a study by Duckworth and Yeager (2015) conducted on education and found that personal interest is the essential factor of selecting and performing well in any education. Likewise, positive association has been observed in the relationship between personal interest and engineering education of the institution. Additionally, if the personal interest of the student increases the quality of engineering education will also increase (Becerik-Gerber, Gerber, & Ku, 2011). Thus, all of the above studies shows that as far as the personal interest of the students increases that increase the engineering education and vice versa. On the basis of these studies, present study also develops the following hypothesis:

H1: There is a positive link among the personal interest and engineering education of the student in the public sector universities of Thailand.

Parents' Intentions and Engineering Education

The success of engineering education depends upon the intentions of the parents regarding the selection of the subject. If the parents are interested in engineering education then the output of the education will be perfect for the country and vice versa (Bhandari, 2012). Moreover, a study conducted by Remeikiene, Startiene, and Dumciuviene (2013) on engineering education and found positive association between parent's intentions and engineering education of the students. In addition, the selection of engineering education depends upon the parent's intentions. If the parents are interested in engineering education then their children select and perfectly perform in engineering education and vice versa. Similarly, a study by Rauch and Hulsink (2015) conducted on education and found that parent's interest is the essential factor of selecting and performing well in any education. Likewise, positive association has been observed in the relationship of parent's intentions and engineering education of the institution. Additionally, if the parent's intentions about engineering education of the student increases the quality of engineering education will also increase (Maresch, Harms, Kailer, & Wimmer-Wurm, 2016). Thus, all of the above studies show that as far as the parent's intentions about engineering education of the student's increases the engineering education also increases and vice versa. On the basis of these studies, present study also develops the following hypothesis:

H2: There is a positive link among the parent's intentions and engineering education of the students in the public sector universities of Thailand.

Job Opportunities and Engineering Education

The success of engineering education depends upon the job opportunities of the relevant subject in the market. If the job opportunities are available in the engineering education then the output of the education will be perfect for the country and vice versa (Mardis et al., 2018). Moreover, a study conducted by Darinskaya and Molodtsova (2014) on engineering education and found positive association between job opportunities and engineering of the students. In addition, the selection of engineering education depends on job opportunities. If the job opportunities are available in the engineering education then their children select and perfectly perform in engineering education and vice versa. Similarly, a study by Rideout and Gray (2013) conducted on education and found that job opportunities are the essential factor of selecting and performing well in any education. Likewise, positive association has been observed in the relationship between job opportunities and engineering education of the institution. Additionally, if the job opportunities about engineering education of the student increases the quality of engineering education will also increase (Sacks & Pikas, 2013). Thus, all of the above studies show that as far as the job opportunities about engineering education of the student's increases the engineering education also increases and vice versa. On the basis of these studies, present study also develop the following hypothesis:

H3: There is a positive link among the job opportunities and engineering education of the students in the public sector universities of Thailand.

Mediating Role of Financial Condition

The decisions of selecting anything in life depends upon the financial condition of the person or firm at time of selecting. Similarly, when a student was selecting a subject of his or his parents' interest maybe this selection affected by the financial condition of his or his parents (Kostyukova, Yakovenko, Germanova, Frolov, & Grishanova, 2017b). Moreover, many of the individual and firm decisions are depends upon the financial condition, if the financial conditions are favorable then they make expenses decision with no hesitation but if the financial condition is not favorable then cheap decision also create hesitation for the individual as well as firm (Xiao, Yang, Pang, & Dang, 2012). In addition, a study by Alabede, Ariffin, and Idris (2011) conducted on moderating role of financial condition and found that financial condition moderated the relationships and suggested that it will be used as mediating variable in other studies, and this study used it as mediator. Furthermore, financial condition has the ability to change the minds of individual and firms to take the decisions

for any project. If company has finance then they take expensive projects but if they have no finance then they take less expensive projects (Sueyoshi & Goto, 2010). Thus, financial condition can be modify the relationship between the variables and this study used as a mediator because financial condition may change the student or parent's interest about the selection of the subject and develop the following hypotheses:

H4 (a): Financial condition mediates the relationship among the personal interest and engineering education of the student of public sector universities in Thailand.

H4 (b): Financial condition mediates the relationship among the parents' intentions and engineering education of the student of public sector universities in Thailand.

H4 (c): Financial condition mediates the relationship among the job opportunities and engineering education of the student of public sector universities in Thailand.

III. RESEARCH METHODS

The purpose of the study is to examine the attitudes of university students of Thailand towards engineering education and the mediating role of financial condition. The attitude of the graduation students consist upon their personal interest, parent's intentions and job opportunities available in the market and this study take all these factors as predictor and financial condition as a mediator of the study. The students of graduation who selected the engineering education were the respondent of the study. Data were collected by personal visit to the public sector universities of Bangkok, Thailand. This study was used the PLS-SEM for the analysis of the data.

Measures

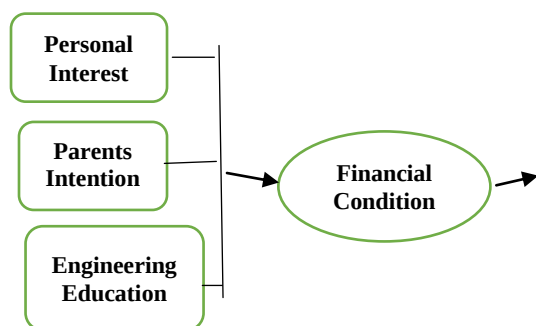
This study used the engineering education (EE) as the main variable with 10 items, while attitude of the graduation students consists upon their personal interest (PI), parent's intentions (PN) and job opportunities (JO) used as independent variables with 14, 26 and 17 items respectively. In addition, financial condition (FC) used as mediating variable with 7 items. All the items consist upon five-point Likert scale.

Data Collection Procedure

The students of graduation who selected the engineering education were the respondent of the study. There are five public sector universities situated in the capital city of Thailand. Data were collected by personal visit to that public sector universities of Bangkok, Thailand. Around 700 questionnaires were distributed who are doing graduation in engineering and after fifteen days get the responses from

them. Only 520 valid responses were received from the respondents that are approximately 74.29 percent response rate.

Theoretical Framework



IV. RESULTS

The results consist of the measurement model assessment and structural model assessment. The measurement model assessment consist upon convergent as well as discriminant validity. According to the figures below, the convergent validity is valid because all the criteria are fulfilled, such as loadings, Alpha and CR are greater than 0.07 and AVE greater than 0.50. Table 2 given below shows the convergent validity of the study.

Table 2
Convergent Validity

Constructs	Items	Loadings	Alpha	CR	AVE
Personal Interest	PI10	0.795	0.940	0.948	0.566
	PI11	0.846			
	PI12	0.659			
	PI13	0.779			
	PI14	0.846			
	PI1	0.794			
	PI2	0.853			
	PI3	0.653			
	PI4	0.674			
	PI5	0.660			
	PI6	0.854			
	PI7	0.714			
	PI8	0.663			
	PI9	0.685			
Engineering Education	EE1	0.579	0.920	0.934	0.588
	EE10	0.765			
	EE2	0.842			

Financial Condition	EE3	0.645	0.938	0.950	0.730
	EE4	0.810			
	EE5	0.798			
	EE6	0.782			
	EE7	0.815			
	EE8	0.804			
	EE9	0.786			
Parents' Intentions	FC1	0.831	0.962	0.965	0.552
	FC2	0.866			
	FC3	0.858			
	FC4	0.830			
	FC5	0.880			
	FC6	0.868			
	FC7	0.849			
	PN1	0.810			
	PN10	0.773			
	PN11	0.492			
	PN12	0.526			
	PN13	0.556			
	PN14	0.549			
	PN15	0.814			

Table 2
Continue

Constructs	Items	Loadings	Alpha	CR	AVE
Job Opportunities	PN16	0.803	0.930	0.933	0.538
	PN17	0.801			
	PN18	0.788			
	PN19	0.705			
	PN2	0.814			
	PN20	0.769			
	PN21	0.745			
	PN22	0.813			
	PN23	0.774			
	PN3	0.800			
	PN4	0.787			
	PN5	0.785			
	PN6	0.704			
Job Opportunities	PN7	0.767			
	PN8	0.747			
Job Opportunities	PN9	0.807			
	JO1	0.773			
Job Opportunities	JO13	0.667			

JO14	0.653
JO15	0.771
JO16	0.714
JO17	0.806
JO2	0.707
JO3	0.815
JO4	0.769
JO5	0.728
JO6	0.732
JO7	0.644

The first criteria to check the discriminant validity is the Fornell Larcker, and first value of the construct is higher than the rest of the values that means no problem with discriminant validity. Table 3 and Table 4 given below shows the discriminant validity through Fornell Larcker and cross-loadings.

Table 3
Fornell Larcker

	OI	EE	FC	PN	JO
OI	0.752				
EE	0.358	0.767			
FC	0.728	0.410	0.855		
PN	0.575	0.540	0.593	0.743	
JO	0.567	0.380	0.356	0.389	0.734

Table 4
Cross Loadings

	OI	EE	FC	PN	JO
PI10	0.795	0.167	0.621	0.408	0.233
PI11	0.846	0.165	0.665	0.395	0.351
PI12	0.659	0.456	0.374	0.480	0.607
PI13	0.779	0.148	0.627	0.390	0.195
PI14	0.846	0.182	0.672	0.388	0.340
PI1	0.794	0.171	0.624	0.402	0.229
PI2	0.853	0.174	0.676	0.390	0.345
PI3	0.653	0.420	0.391	0.495	0.667
PI4	0.674	0.433	0.419	0.501	0.653
PI5	0.660	0.454	0.374	0.478	0.611
PI6	0.854	0.185	0.674	0.406	0.341
PI7	0.714	0.160	0.595	0.402	0.304
PI8	0.663	0.414	0.398	0.497	0.673
PI9	0.685	0.410	0.427	0.509	0.637
EE1	0.185	0.579	0.191	0.307	0.363

EE10	0.321	0.765	0.368	0.487	0.309
EE2	0.298	0.842	0.347	0.445	0.300
EE3	0.230	0.645	0.234	0.274	0.283
EE4	0.329	0.810	0.327	0.452	0.322
EE5	0.267	0.798	0.301	0.393	0.246
EE6	0.281	0.782	0.347	0.408	0.244
EE7	0.294	0.815	0.342	0.445	0.272
EE8	0.214	0.804	0.310	0.390	0.278
EE9	0.293	0.786	0.330	0.479	0.303
FC1	0.612	0.345	0.831	0.451	0.307
FC2	0.656	0.348	0.866	0.531	0.276
FC3	0.604	0.332	0.858	0.487	0.298
FC4	0.648	0.303	0.830	0.526	0.303
FC5	0.647	0.319	0.880	0.520	0.340

Table 4
Continue

	OI	EE	FC	PN	JO
FC6	0.619	0.380	0.868	0.527	0.290
FC7	0.565	0.424	0.849	0.501	0.317
PN1	0.367	0.477	0.372	0.810	0.284
PN10	0.358	0.299	0.365	0.773	0.209
PN11	0.732	0.287	0.739	0.492	0.311
PN12	0.534	0.388	0.620	0.526	0.214
PN13	0.648	0.280	0.679	0.556	0.328
PN14	0.641	0.263	0.669	0.549	0.313
PN15	0.360	0.463	0.368	0.814	0.286
PN16	0.378	0.453	0.370	0.803	0.302
PN17	0.362	0.466	0.344	0.801	0.341
PN18	0.382	0.454	0.372	0.788	0.292
PN19	0.302	0.341	0.346	0.705	0.249
PN2	0.381	0.453	0.383	0.814	0.308
PN20	0.387	0.388	0.360	0.769	0.273
PN21	0.356	0.406	0.346	0.745	0.307
PN22	0.324	0.400	0.390	0.813	0.243
PN23	0.357	0.304	0.361	0.774	0.211
PN3	0.370	0.464	0.346	0.800	0.332
PN4	0.373	0.473	0.377	0.787	0.310
PN5	0.378	0.457	0.364	0.785	0.289
PN6	0.297	0.353	0.350	0.704	0.248
PN7	0.384	0.392	0.365	0.767	0.273
PN8	0.352	0.402	0.347	0.747	0.302
PN9	0.324	0.401	0.391	0.807	0.242
JO1	0.331	0.202	0.160	0.157	0.773

JO13	0.653	0.420	0.391	0.495	0.667
JO14	0.674	0.433	0.419	0.501	0.653
JO15	0.335	0.200	0.167	0.165	0.771
JO16	0.261	0.263	0.265	0.211	0.714
JO17	0.290	0.221	0.147	0.191	0.806
JO2	0.264	0.261	0.274	0.208	0.707
JO3	0.315	0.225	0.174	0.217	0.815
JO4	0.325	0.143	0.156	0.171	0.769
JO5	0.249	0.116	0.118	0.078	0.728
JO6	0.257	0.095	0.114	0.127	0.732
JO7	0.218	0.096	0.126	0.140	0.644

The second criteria are HTMT ratio and according to this criteria no problem with discriminant validity because all the values are less than 0.80. Table 5 given below shows the HTMT ratio:

Table 5
HTML Ratio

	OI	EE	FC	PN	JO
OI					
EE	0.402				
FC	0.764	0.437			
PN	0.591	0.562	0.597		
JO	0.510	0.323	0.298	0.306	

.341, which means predictors all together explain the dependent variable by 34.1 percent. The multicollinearity (VIF) values are less than 5.00 that means no issue with multicollinearity. Table 6 and Table 7 given below shows the coefficient of determination (R Square) and multicollinearity:

Table 6
Coefficient of Determination

	R Square	R Square Adjusted
EE	0.341	0.332
FC	0.583	0.579

Table 7
Multicollinearity

	EE	FC
PI	2.846	1.884
FC	2.398	
PN	1.683	1.508
JO	1.514	1.486

The regression analysis shows that the predictors such as parents' intentions and job opportunities have significant positive while personal interest has an insignificant relationship with engineering education. Moreover, the results also show that financial condition mediates the relationship between personal interest and engineering education as well as parents' intentions and engineering education but does not mediate between the link of job opportunities and engineering education. Table 8 given below shows the path analysis of the study:

Table 8
Path Analysis

	Beta	S.D.	t-statistics	p-values	L.L	U.L.
PI -> EE	0.158	0.104	1.531	0.063	0.320	0.010
PI -> FC	0.633	0.066	9.540	0.000	0.517	0.740
FC -> EE	0.186	0.100	1.866	0.031	0.028	0.360
PN -> EE	0.429	0.074	5.791	0.000	0.299	0.544
PN -> FC	0.271	0.054	5.002	0.000	0.170	0.357
JO -> EE	0.236	0.066	3.593	0.000	0.135	0.344
JO -> FC	0.108	0.057	1.908	0.028	0.193	0.002
PI -> FC -> EE	0.118	0.065	1.813	0.035	0.016	0.230

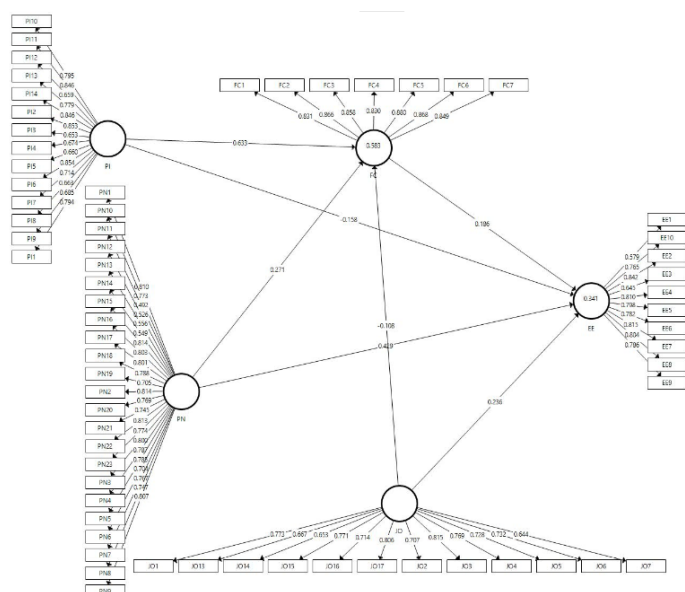


Figure 2

Measurement Model Assessment

The R square value shows the variation in the dependent variable due to all the predictors and results shows R square

PN -> FC ->						
EE	0.050	0.030	1.696	0.045	0.008	0.108
JO -> FC ->	-					
EE	0.020	0.016	1.286	0.100	0.048	0.002

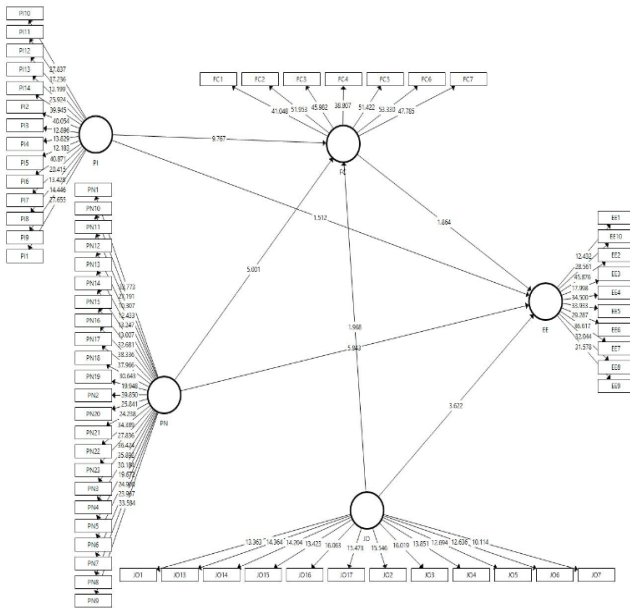


Figure 3
Structural Model Assessment

V. DISCUSSIONS AND CONCLUSION

The purpose of the study is to examine the attitudes of university students of Thailand towards engineering education and the mediating role of financial condition. The attitude of the graduation students consist upon their personal interest, parent's intensions and job opportunities available in the market and this study take all these factors as predictor and financial condition as a mediator of the study. The results found that students' personal interest does not influence on the engineering education while parents' intentions and job opportunities are influenced engineering education in a positive way. That is the main issue of lack of quality in the engineering education because student select that subject which the preference of their parents or the subject which provides them the jobs in the future but did not choose the subject of their own choice that is the reason their interest level is going down and not pul full intention on the subject. Moreover, financial condition mediates the relationship between personal interest and engineering education as well as parents' intentions and engineering education but does not mediate between the link of job opportunities and engineering education. This situation shows that the financial condition changes the interest of the students and parents about the

subject and create hurdle for getting engineering education and producing quality engineers.

This study concluded that parents' intentions and job opportunities dominant on the personal interest of the student in selecting the subject that is the reason of lack of quality engineers produced by the education institution of Thailand with respect to other countries. Moreover, financial condition also a hardel in the way selecting the subject that is also the main reason for lack of quality engineers produced by the education institution of Thailand with respect to other countries. Thus, this study suggested to the policymakers that they should focus on the attitudes of the students in selecting the engineering education and also provides them financial assistant that should enhance the interest of the students towards engineering education.

The present study also has some limitations and future directions for the upcoming researchers. Firstly, this study takes only one country for analysis, and other countries may add ore countries and go for cross country analysis. Secondly, this study takes only three attitudes of the students such as personal interest, parents' intention and job opportunities. Future studies may add more factors to predict engineering education. Thirdly, this study takes only financial condition as mediator, and future studies can add more factors as mediator.

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