



Factors Influencing Students of Technology-based Universities to Become Entrepreneurs

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ABSTRACT

Entrepreneurial activities, other than providing employment opportunity and help improved competitiveness, also becoming incubators of technological innovations. The investigation on factors influencing students of technology-based universities to become entrepreneurs is crucial as it enables the researcher to identify the contributing factors that might significantly influence these potential graduates to embark on entrepreneurial activities. In other words, the research could unravel the enabling factors of the undergraduate students to become entrepreneurs. The external elements being investigated were the role model and the role of the universities in promoting entrepreneurship. The study also focused on the internal elements which were views of achievement and views of personal control on the inclination to become entrepreneurs. The results of the analysis vary from one university to another. Nevertheless, the investigation reveals that for full data set, role model, views on achievement, and views on personal control have a positive significant relationship with an inclination of students to become entrepreneurs.

Keywords: Entrepreneurship, Entrepreneurial Mindset, Entrepreneurship Education

JEL Classifications: J23, I26, I23

1. INTRODUCTION

Every year universities in Malaysia produce a substantial number of graduates in vast area of studies. The competitions in the job market among universities' graduates have become so intense where jobs accessible are insufficient, which lead to the issue of employability among the graduates. In 2015, the largest percentage of unemployed people were youth in the age group of 20-24 years that contributed 42.1% (Department of Statistics, Malaysia, 2016). The scenario reflected the difficulties of graduates who normally completed their studies between that particular range of age. In the current competitive job market, one must compete to secure a job as supply and opportunities of job are inadequate. Consequently, many graduates failed to secure job upon graduation.

On April 13, 2010, the ministry of higher education (MoHE) introduced entrepreneurship Development Policy for institutions of

higher education (IoHE). The primary objective of the policy is to encourage human capital development in generating knowledgeable and innovative graduate entrepreneurs who are capable of facing the economic development challenges. The policy encompassed six strategic core, in which the establishment of entrepreneurship center in every IoHE is one of them. The respective center functions as the planning, coordinating, monitoring and evaluating the entrepreneurship programs, and entrepreneurship education activities (MoHE, 2010). In an Entrepreneurship Program (2012), instilling entrepreneurial culture among the students has been identified as the eminent platform in creating innovative human capital. Hence, the entrepreneurship culture that is being developed in IoHE through the corresponding policy is hoped to be able to enhance the awareness of the significance of entrepreneurship to the students.

In supporting the initiative, the government of Malaysia through several of its agencies, namely, small and medium enterprise

corporation (SMECorp), Majlis Amanah Rakyat, SME bank (SME bank), Institut Keusahawanan Nasional and others have developed numerous opportunities for all Malaysians, including the graduates, to embark on entrepreneurial ventures at the SME level. One of the government strategies to overcome employability issues is to provide business opportunity to everyone and encourage them to become entrepreneurs. The extensive efforts of these government agencies are predominantly to inculcate the entrepreneurial spirit and development of entrepreneurship in the country. SMECorp, for instance, is responsible 'to empower the critical mass of SMEs with efficient processes, robust business models, access to financial resources, smart partnerships, market-entry strategies and sustainable growth solutions, through various platforms and programmes for SME development' (SMECorp, 2016).

2. ENTREPRENEURSHIP

2.1. The Significance of Entrepreneurship

Entrepreneurship has become so prevalent for the agenda of economic development of a country (Christensen et al., 2002). Even university students keep discussing on the importance of entrepreneurship in many aspects like career opportunities, economic development and so forth. Solomon et al. (2005) indicated that over the last decade a significant attention in entrepreneurship studies has been amplified at the undergraduate and graduate level. Matlay and Westhead (2005) pinpointed that annual international conferences, workshops and summits are conducted that focused on the magnitude of entrepreneurship to the development of individual, society and country.

At the moment, entrepreneurship is considered as critical strategies in developing economy of a country or nation. Entrepreneurship is not only favorable but also critical for a resilient economy (Henry et al., 2003; Gorman et al., 1997). According to Schaper and Volery (2004), in facing the challenges of globalization, many countries have focused on entrepreneurship in enhancing their competitiveness and economic growth. The success of Alibaba.com founded by Jack Ma has become one of the crucial means of economic growth in the People Republic of China (PRC). As an authentic entrepreneurial leader, Jack has contributed enormously to the economic development of PRC in recent years. As of May 2016, the company has recorded sales value of USD 14.96 billion and employs more than 36 thousand of employees (The Forbes, 2016). Entrepreneurship has positive impacts and become a catalyst of economic growth as it created job opportunities and generated income to the people of the country (Gurol and Atsan, 2006). Scarborough and Zimmerer (2003), in particular, described entrepreneurship as the driving factor for competitiveness, innovation and economic improvements of many nations.

The fact that wages employment or secure employment is no longer a guarantee especially in the public sector for university graduates has become one of the prominent aspects explaining this unsurpassed occurrence (Nafukho and Muyia, 2010). In addition, the luxury thought of university graduates are the elite and intelligent group in the society, whom can easily acquire employment upon graduation has no longer reflected the realities of today's employment world (Seet and Seet, 2006). Henry

(2003) reiterated that students are now acquiring knowledge and skills on business acumen that enable them to obtain relevant entrepreneurial knowledge and skills in opening up new business ventures. The importance and contributions of entrepreneurial endeavors have widely become critical research topic among the academia as well as the industrial practitioners (Lee et al. 2005).

2.2. Entrepreneurship Research

Most research has identified that there is a positive correlation between economic progress and entrepreneurial activities notably, in terms of the transformation in technology, sustainability of the companies and generation of new job opportunities (Karanassios et al., 2006). A work by O'Shea et al. (2005) ascertained a significant relationship between entrepreneurial spinoffs and the support from the universities. Collins et al. (2004) studied on the entrepreneurship aspiration of new students in three universities and found past factors influenced students' experience which created various needs for them.

Nevertheless, certain internal and external elements of individuals might have some significant impacts on the potential endeavors as successful entrepreneurs. Hence, the objective of this study is to investigate the influencing factors of the students at the technology-based universities in Malaysia to embark on entrepreneurial ventures as their future career, taking into account the elements of role model and role of the universities (external), and views on personal control and achievement orientation (internal).

3. RESEARCH FRAMEWORK AND HYPOTHESES

3.1. Research Framework

The questionnaire was developed based on earlier studies by various scholars. The first constructs items on career planning and entrepreneurial inclination (CPEI1-CPEI5) were adapted from Jumaat and Jasmani (2012). There are five items in this section. The role model constructs consist of five items (RM1-RM5) adapted from study previously carried out by Ooi et al. (2011). The third construct under study is role of universities in promoting entrepreneurship that contains five items (RUPE1-RUPE5) adapted from a study done by Jumaat and Jasmani (2012). The fourth construct views on personal control consist of nine items (VPC1-VPC9) were adapted from study by Zullina et al. (2015). Finally, the construct views on achievement were measured through eight items (VA1-VA8) adapted from study done by Zullina et al. (2015). The respondents were required to respond to the statement for each of the construct based on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

3.2. Hypotheses

H₁: There is a significant positive relationship between role model and the inclination of students to become entrepreneurs.

H₂: There is a significant positive relationship between the roles of universities in promoting entrepreneurship on the inclination of students to become entrepreneurs.

H₃: There is a significant positive relationship between views on achievement and the inclination of students to become entrepreneurs.

H₄: There is a significant positive relationship between views on achievement and the inclination of students to become entrepreneurs.

4. METHODOLOGY

4.1. Sample and Data

This study considers three technology-based universities in Malaysia, namely Universiti Teknologi Petronas (UTP) Seri Iskandar, Universiti Malaysia Pahang (UMP) Kuantan and Universiti Teknologi Malaysia (UTM) Skudai. Samples are taken from 3rd year undergraduate students who enrolled in engineering or technology based programs offered by the respective institutions. 152 students have responded to the survey such that 54 students are from UTP, 39 from UMP and the remaining 59 students were from UTM. To perform the data analysis using the proposed model with four predictors, a minimum sample size of 39 were required. This is based on the estimation based on the GPower software that generates a power of 0.80 for a proposed model with large effect size (Hair et al., 2013; Faul et al., 2009). Furthermore, since this study requires a comparison between institutions, a minimum sample of 30 is required for each group (Sekaran and Bougie, 2013).

4.2. Data Analysis

This study employs partial least squares - structural equation modeling (PLS-SEM) to examine both the measurement model and structural model for the proposed framework (Figure 1). Modern views on PLS now see that PLS is considered to be a full-fledge structural equation modeling (Henseler et al., 2016), which act similar to regression analysis but outstand the traditional regression analysis such that it takes into account the measurement error in the analysis. With that in mind, the PLS-SEM is a two-stage process by first assess the measurement model for validity and reliability before continuing the hypothesis testing or path analysis through the structural model analysis stage.

First, we performed Harman's single factor test in order to assess the issue of common method bias with the survey questionnaire. The test shows that a single factor accounted for only 24.015% of the variance extracted which is far below the cutoff value of

50% of the total variance explained (Podsakoff et al., 2003). This result reveals that there is no Common Method bias in our survey questionnaire and we can proceed with the next analysis, which is the PLS-SEM.

To perform the PLS-SEM analysis in this study, we make use the availability of SmartPLS version 2.0 M3 Beta software (Ringle and Wende, 2005). In PLS-SEM, the path coefficients obtained from the structural model analysis are analogous to standardized beta in ordinary least squares obtained from regression analysis. To assess the significant path showing the relationship of one construct to another, we perform bootstrapping procedure with 5000 re-sample as compared to the minimum re-sample of 1000 suggested by Chin (2010). The path is said to be significant if the t-statistic is more than 1.645 (one-tail) or more than 1.96 (two-tail). The path coefficient values obtained ranges from -1 to +1 such that values closer to +1 indicate strong positive linear relationship and values closer to -1 indicate strong negative linear relationship (Hair et al., 2013). For this study, the analysis was repeated four times based on full sample and subgroup sample (full = 152, UTP Seri Iskandar = 54, UMP Kuantan = 39, and UTM Skudai = 59). Before estimating the structural model path, the measurement model criteria such as convergent validity and discriminant validity were examined and separately checked (Hair et al., 2013).

In this study, based on recommendation from Hair et al. (2013), the convergent validity could be achieved through the examination of the items factor loading, average variance extracted (AVE) and composite reliability (CR) of each latent construct. In accordance to Hair et al. (2013), items with loadings <0.5 were removed from the analysis. In addition, items were also removed if the item cross-loading with other constructs were <0.2 (Chin, 1998). On top of the examination on the item factor loadings and cross-loadings, convergent validity was also assessed through its AVE and CR values. Literature suggested that the minimum cutoff values for AVE is 0.5 (Henseler et al., 2009; Hair et al., 2013) and the minimum cutoff value for CR is 0.7 (Hair et al., 2011). Thus, items were removed one by one for each latent construct until both the minimum threshold for AVE and CR were achieved. To be consistent with our analysis, these criteria must assess throughout the full data set and all the three sub data sets based on institutions under study. Table 1 provides the summary of this analysis.

Once the convergent validity was established, the next is to access the discriminant validity of the proposed model. This study employs the Fornell-Larcker criterion analysis to assess the discriminant validity for the full and split sample. To ensure the establishment of discriminant validity through this analysis, we compare the correlation of each construct with the square root of the AVE of the respective construct (Fornell and Larcker, 1981). Table 2 shows that the square root AVE displayed in the diagonals are all greater than its correlation in the off-diagonal elements in its respective column and rows. This suggests that the discriminant validity was achieved for the full and split sample. Thus, based on the result shown in Tables 1 and 2, we can conclude that the measurement model has adequate and satisfactory convergent validity and discriminant validity.

Figure 1: Research framework

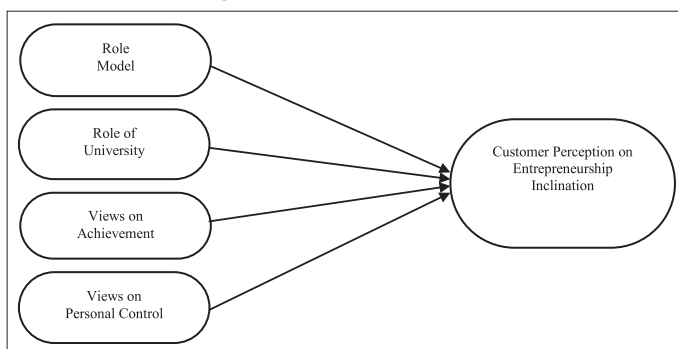


Table 1: Factor loadings, AVE and CR of full and subsamples

Latent construct	Item	Full sample (n=152)			UTP (n=54)			UMP Kuantan (n=39)			UTM Skudai (n=59)		
		Loading	AVE	CR	Loading	AVE	CR	Loading	AVE	CR	Loading	AVE	CR
Career planning and entrepreneurial inclination	CPEI1	0.887	0.771	0.870	0.925	0.822	0.902	0.912	0.831	0.908	0.869	0.665	0.798
	CPEI3	0.868			0.887			0.910			0.757		
	RM2	0.869	0.726	0.842	0.793	0.712	0.831	0.941	0.751	0.857	0.940	0.587	0.726
Role model	RM4	0.835			0.892			0.785			0.540		
	RUPE2	0.871	0.751	0.900	0.783	0.596	0.815	0.944	0.870	0.953	0.837	0.729	0.889
Role of university	RUPE3	0.888			0.849			0.903			0.893		
	RUPE4	0.841			0.675			0.950			0.829		
Views on achievement	VA2	0.738	0.631	0.911	0.737	0.593	0.897	0.864	0.766	0.952	0.617	0.545	0.876
	VA4	0.831			0.825			0.931			0.721		
	VA5	0.755			0.673			0.763			0.839		
	VA6	0.768			0.726			0.873			0.622		
	VA7	0.827			0.806			0.903			0.797		
	VA8	0.842			0.841			0.909			0.802		
	VPC6	0.776	0.654	0.850	0.824	0.670	0.858	0.547	0.650	0.842	0.826	0.586	0.809
	VPC8	0.869			0.876			0.915			0.765		
VPC9	0.777			0.751			0.901			0.700			

AVE: Average variance extracted, CR: Composite reliability, UTP: Universiti Teknologi Petronas, UMP: Universiti Malaysia Pahang, UTM: Universiti Teknologi Malaysia

Table 2: Fornell–Larcker criterion discriminant validity of data sets

	[1]	[2]	[3]	[4]	[5]
Full sample (n=152)					
[1] CPEI	0.878				
[2] RM	0.395	0.852			
[3] RUPE	0.291	0.147	0.867		
[4] VA	0.372	-0.010	0.368	0.794	
[5] VPC	0.550	0.435	0.266	0.313	0.808
UTP (n=54)					
[1] CPEI	0.906				
[2] RM	0.514	0.844			
[3] RUPE	0.481	0.175	0.772		
[4] VA	0.326	-0.007	0.562	0.770	
[5] VPC	0.609	0.427	0.436	0.227	0.818
UMP Kuantan (n=39)					
[1] CPEI	0.911				
[2] RM	0.376	0.866			
[3] RUPE	0.278	0.501	0.933		
[4] VA	0.633	0.214	0.228	0.875	
[5] VPC	0.546	0.509	0.418	0.694	0.806
UTM Skudai (n=59)					
[1] CPEI	0.815				
[2] RM	0.225	0.766			
[3] RUPE	0.237	-0.133	0.854		
[4] VA	0.325	0.021	0.484	0.738	
[5] VPC	0.526	0.216	0.047	0.286	0.765

Diagonal elements are the square roots of the AVE while the off diagonals are the correlations between constructs. CPEI: Career planning and entrepreneurial inclination, RM: Role model, RUPE: Role of universities in promoting entrepreneurship, VA: Views on achievement, VPC: Views on personal control, AVE: Average variance extracted, UTP: Universiti Teknologi Petronas, UMP: Universiti Malaysia Pahang, UTM: Universiti Teknologi Malaysia

Once the measurement model was established, we perform the structural model analysis to test the hypotheses developed earlier. The structural model path coefficients and the R² were examined

to determine how well the data supported the hypothesized model being proposed for the full and split sample (Chin, 1998). According to Chin (1998), he suggested that we used the bootstrapping method with a resampling of at least 1000 to test the significance of the path coefficients estimated from the structural model analysis. In this study, we performed 5000 resampling. The path significance was investigated using the calculated t-statistics obtain from the bootstrapping method. We employ a directional hypothesis test such that the path estimate is significant if the t-statistic values are well above the critical t = 1.645. The goodness of fit (GoF) index measures the model fit by using the geometric mean of the average communality and the average R² (GoF = $\sqrt{AVE \times R^2}$). The cutoff values for assessing GoF analysis are GoF_{small} = 0.1, GoF_{medium} = 0.25 and GoF_{large} = 0.35 (Hoffmann and Birnbroich, 2012). Table 3 and Figure 2 provide the summary of the path coefficients results.

H₁: Hypothesis related to role model and the inclination of students to become entrepreneurs. Based on the result shown in Table 3, we found that H₁ was supported in the full data (β = 0.231, P < 0.05) and the UTP Seri Iskandar data (β = 0.332, P < 0.01). However, H₁ was not supported for the UMP Kuantan and UTM Skudai since the t-value was 1.547 and 1.500 respectively, which is lower than the critical t-statistics of 1.645.

H₂: Hypothesis related to the role of universities in promoting entrepreneurship on the inclination of students to become entrepreneurs.

The analysis indicates that H₂ is supported in the UTP Seri Iskandar data (β = 0.190, P < 0.05) and the UTM Skudai data (β = 0.187, P < 0.05). For both the full data and UMP Kuantan data, the hypothesis was not supported.

Table 3: Result for direct path relationship for full and subsamples

Hypotheses Path	Full sample (n=152)			UTP (n=54)			UMP Kuantan (n=39)			UTM Skudai (n=59)		
	Standard beta	SE	t-value	Result	Standard beta	SE	t-value	Result	Standard beta	SE	t-value	Result
H ₁ RM→CPEI	0.2311	0.0991	2.3334*	S	0.3317	0.1008	3.2889**	S	0.2274	0.1470	1.5466	NS
H ₂ RUPE→CPEI	0.0759	0.0546	1.3901	NS	0.1901	0.1054	1.8031*	S	0.0230	0.1035	0.2225	NS
H ₃ VA→CPEI	0.2354	0.0862	2.7321**	S	0.1415	0.1083	1.3059	NS	0.5543	0.1883	2.9434**	S
H ₄ VPC→CPEI	0.3554	0.0988	3.5983**	S	0.3525	0.1203	2.9297**	S	0.0353	0.1456	0.2428	NS

**P<0.01, *P<0.05, CPEI: Career planning and entrepreneurial inclination, RM: Role model, RUPE: Role of universities in promoting entrepreneurship, VA: Views on achievement, VPC: Views on personal control, UTP: Universiti Teknologi Petronas, UMP: Universiti Malaysia Pahang, UTM: Universiti Teknologi Malaysia, SE: Standard error, S: Significance, NS: Non-significance

H₃: Hypothesis related to views on achievement and the inclination of students to become entrepreneurs.

Findings shown in Table 3 revealed that H₃ was supported for the full data ($\beta = 0.235, P < 0.01$) and for the UMP Kuantan data ($\beta = 0.554, P < 0.01$). On the other hand, H₃ was not supported for the UTP Seri Iskandar data and UTM Skudai data.

H₄: Hypothesis related to views on personal control and the inclination of students to become entrepreneurs.

The result found in Table 3 indicate that H₄ was supported for full data ($\beta = 0.355, P < 0.01$), UTP Seri Iskandar data ($\beta = 0.353, P < 0.01$), and UTM Skudai data ($\beta = 0.456, P < 0.01$), but not for the UMP Kuantan data.

5. DISCUSSIONS AND FINDINGS

Based on the results shown in Figure 2 and Table 3, it reveals that for full data set, role model, views on achievement, and views on personal control have a positive significant relationship with an inclination of students to become entrepreneurs. The model explained about 39.6% of the total variation ($R^2 = 0.393$) and have a medium effect size according to Cohen (1988). The GoF index for the full data valued at 0.529, which indicate a good model fit.

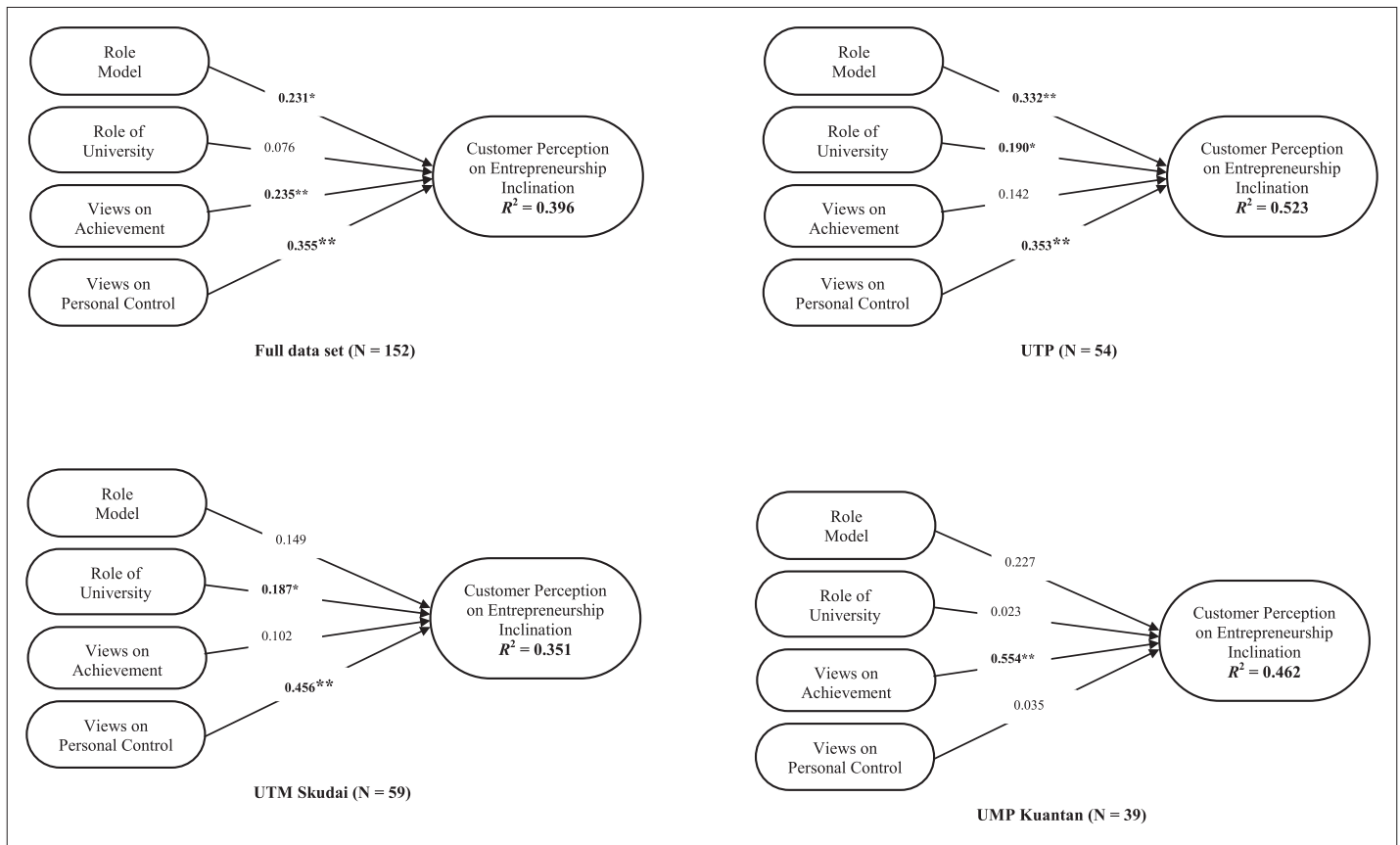
For the UTP Seri Iskandar data set, role model, role of universities in promoting entrepreneurship, and views on achievement have a positive significant relationship with an inclination of students to become entrepreneurs and the model explained about 52.3% of the total variation ($R^2 = 0.523$) with a large effect size based on Cohen (1988). The GoF = 0.596 for UTP Seri Iskandar data indicate that the proposed model has a good model fit.

For the UMP Kuantan data set, only views on personal control has a positive significant relationship with an inclination of students to become entrepreneurs that account for almost 46.2% total variance explained ($R^2 = 0.462$) with large effect size according to Cohen (1988). The GoF = 0.598 for UMP Kuantan data indicate that a good model fit was established.

Finally, yet importantly, for the UTM Skudai data set, the role of universities in promoting entrepreneurship and views on personal control were positively significantly influence the inclination of students to become entrepreneurs. The GoF = 0.467 indicate that the model fit well with the data and account for 35.1% of the total variance explained ($R^2 = 0.351$).

6. CONCLUSIONS AND LIMITATIONS

The study was designed to investigate the factors influencing students of technology-based universities to become entrepreneurs. In summary, role model, role of universities in promoting entrepreneurship, and views on achievement had a positive significant relationship with an inclination of students to become entrepreneurs for UTP Seri Iskandar students. For UMP Kuantan, only views on personal control had a positive significant relationship

Figure 2: Summary of path coefficients results

with an inclination of students to become entrepreneurs, whereas, UTM Skudai shared the role of universities in promoting entrepreneurship with UTP Seri Iskandar and views on personal control with UMP Kuantan students to become entrepreneurs. Based on the overall results, the likelihood of students to embark on entrepreneurial ventures after their graduation was quite diverse between these universities. Nevertheless, two similar factors were found to be shared between at least two of the universities. The role of universities in promoting entrepreneurship were shared between UTP Seri Iskandar and UTM Skudai, and the views on personal control were shared between UMP Kuantan and UTM Skudai. It offered the impression that UTP Seri Iskandar and UTM Skudai had effectively inculcated the entrepreneurship culture to their students, which corresponded to the aspiration of MoHE when they introduced the Entrepreneurship Development Policy for IoHE back in 2010 (MoHE, 2010). It was also thought-provoking to comprehend the influence of the role of universities in promoting entrepreneurship over the view of personal control and vice versa since the relationship of both factors were not being analyzed, but were found had positive significant relationship with an inclination of students to become entrepreneurs for UTM Skudai.

Even so, as this study was restricted to only three technology-based universities in Malaysia, the findings and conclusions might only be representing those institutions. Other limitations were external factors like entrepreneurial curriculum education and entrepreneurial internship program, and internal factors like views on innovation and views on self-esteem, which might have effect on the research variables that were excluded in the study. More

research on this particular area with a larger sample of respondents, more related variables and addition of few other technology-based universities might further validate the outcome of this research.

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