

## Entrepreneurial Intention Challenge in TVET Education

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### Abstract

Effective entrepreneurship course among TVET students are critical. The economic situation can be revived by new business venture. Knowledge learnt promotes self-reliance while real practices made meaningful contributions to the nation. 108 respondents were selected through convenience sampling from 2 engineering programs at a public TVET university in Melaka. Descriptive analysis yields high mean values between 81.5%-91.7% on perceive importance, business interest, sales/marketing skills, enjoy practical activities, and understand syllabus where 19.4% of the students managed to own legitimate business. The study used hybrid analysis between SPSS on the moderating effect and SEM-AMOS on the mediating effect. In the first analysis, the study examined whether "course delivery" could induce a moderating effect on the model understudy. The 3 variables correlated well with one another. Multiple regression showed significant "entrepreneurial intention" among students. Although "course delivery" explains further 2.5% variance in the "appropriate behaviors", the model interaction has a negative effect toward students' "entrepreneurial intention". In second analysis, AMOS was used as CFA to test and validate the mediating effect on the variables direct, indirect and total effects dimensions. The outputs demonstrate acceptable goodness of fit indices from the measurement model where Chi-square and comparative fit (CMin/df, CFI, SRMR, and RMSEA) values were statistically significant at 0.5 level. However, the value of 0.072 at the variables intersection concludes that "course delivery" did not mediate the relationship between "appropriate behaviors" and "entrepreneurial intention". Hence, both analysis results were consistent in which "course delivery" was not the main factor in determining an effective "entrepreneurial intention" among the TVET engineering students. It suggested the improve of "appropriate behaviors" factors assimilation to become global entrepreneurs and self-sustained TVET graduates.

## 1. Introduction

Self-employment has been one of the employability criteria for TVET graduates as stressed by Hong et al. (2023). Research findings by Utamingtyas (2021) and Wiramihardja et al. (2022) supported the existence of entrepreneurial intention levels among vocational and technical students in Malaysia. They have asserted that interest and attitudes in entrepreneurship were very strong while moderate for social norms, self-efficacy, and efficiency in entrepreneurship knowledge. Likewise, entrepreneurship education should equip students with entrepreneurship understanding and skills, which could be their source of interest to become an entrepreneur when facing the risk of not getting hired in the labor market after graduating (Abu Bakar et al., 2022; Husna et al., 2021). It is indeed a fact that TVET managed to bridge the skills gap or mismatch among the country's workforces.

Since the end of 2017, TVET has intensified into academic excellence programs that increasingly gained attention from employers due to the emergence of IR4.0 industry. With the ultimate goal of realizing global workforce, the main foundations of TVET have been built upon practical components, psychomotor skills, and exposure to industry. In addition, Othman et al. (2021) asserted that entrepreneurship role integration into TVET education in public universities is to improve the communities' well-being by creating new career opportunities for future graduates and other people. Therefore, it is critical to enhance the entrepreneurial intention among Malaysia Technical University Network (MTUN) students to produce as many job creators as possible (Hartono, 2021).

In 2012, the Ministry of Education (MoE) has seriously advocated TVET workforce by introducing its Vocational Education Transformation Plan in the country. As it is bearing fruit today, the aspiration to groom 10% of these graduates to choose entrepreneurship career path looks more realistic. Moving forward, cultivating entrepreneurial mindset among the MTUN students becomes very challenging and important for the Malaysian economic.

In light of the technological advancement in IR4.0, the ministry has set a new target to see that 55 percent of undergraduates would choose TVET skills for their career comes 2025, reported the New Straits Time. The government has rationalized the execution to be in line with the 12th Malaysia Plan in recognition of the Malaysian Skills Certificate (SKM). Hence, the future of TVET education should go in hand with the collaboration of industry players by strengthening their business niche agenda as Malaysia desire to become a developed country. The Minister of Higher Education, Datuk Seri Mohamed Khaled Nordin, urges the TVET universities involved to find ways to meet the demands of TVET education in the 13th Malaysia Plan through increasing student enrolment, exploring high-end and advanced fields, and hiring more educators (Subramaniam & Abdul Aziz, 2023).

Today, jobs in industries require technical skills that can be obtained through TVET education in colleges and institutions of higher learning. Potential graduates are trained to gain knowledge in technical fields for the sake of industrial sustainability in the AI era which will benefit Malaysia. Previous studies have been conducted to identify perception and challenges in the aspects of TVET governance, soft skills, and teaching competencies that suggest the need to improve TVET programs so that they are relevant for their business growth (Bassah, 2022). Furthermore, most studies on TVET also discuss the issue of how organizations set the configuration, conditions, and business dynamics in controlling the quality of their operations and results (Subramaniam & Abdul Aziz, 2023). The researchers also emphasized TVET framework in Malaysia over the past decade in governance, quality assurance, industry, perception, and financing. Nevertheless, the subject matter remains to be complex, ambiguously interpreted, and mixed, where further research outcomes need to affirm the extent of how much it has been achieved in its implementation.

By producing graduates who are trained and skilled in technical careers in the industry, this will contribute to the ability to carry out organizational functions where businesses will be viable to support the economic growth of this country. However, technical skills alone are not enough. Graduates in engineering will eventually climb the career ladder as decision makers or managers. At this point they also need to have entrepreneurial skills in order to successfully carry out the company's business operations optimally to enjoy profits at the end of the year.

The results of the TVET program not only help to reduce the gap in practical skills, but to address the digital economy, knowledge in technological entrepreneurship that is more challenging is much needed in the job market. Employers can easily enlist the services of would-be technocrats to ensure their businesses remain sustainable. From an economic point of view, organizations with creative employees will continue to innovate new products and automatically open up opportunities for new jobs to emerge.

Likewise, this will also encourage direct collaboration between local employers and TVET institutions where this helps boost the local economy when skilled labor is available for the local organizational market. Thus, employers can open new job opportunities within the scope of the collaborative community. Skilled local workers will undoubtedly provide significant long-term benefits to Malaysia's industrial and economic development, although investing in TVET training is not easy without an organization's desire to succeed in their

business. In this study, the emphasis on entrepreneurial elements in TVET education is important to ensure its implementation is effective to help the country's competitive economy.

### 1.1 Theory Adopted and Model Development

Previous studies discovered that entrepreneurial mindset has a considerable influence on entrepreneurial intention and were highly related (Cui et al., 2021). Morris & Tucker (2023) defined entrepreneurial mindset as an individual commitment toward entrepreneurial activities by his attitude and self-efficacy, that is positively related to self-capability. On the other hand, Yasir et al. (2022) described entrepreneurial intention as a psychological state that guided our attention toward specific business goals in order to achieve entrepreneurial results. It was also a recognition that individuals took actions to develop new businesses or create new values in existing enterprises.

Theory of planned behavior (TPB) was coined by Icek Ajzen back in 1985 and interacts between a person's attitude, perceived behavioral control, and the subjective norms of society (on expectation influencing the person's intention and final behavior). Yasir et al. (2021) and Yasir et al. (2022) asserted that a realistic opportunity or TPB as a dominant intentions model would be driven by perceptions of desirability and controllability (feasibility). Besides, internal attitude and commitment (of mindset) have positive impact on entrepreneurial intention in which emotional bonding (Hocenski & Juraj, n.d.) and work engagement (Linggiallo et al., 2021) are necessary for a person to perform in his career. The TPB theory as in Figure 1 is based around understanding and predicting human behaviors, which could be utilized for various entrepreneurial situations combining with other contextual and control variables (Dao et al., 2021). Consequently, for this study, appropriate behavior was shaped from these guidelines and translated into the person successful venture into business.

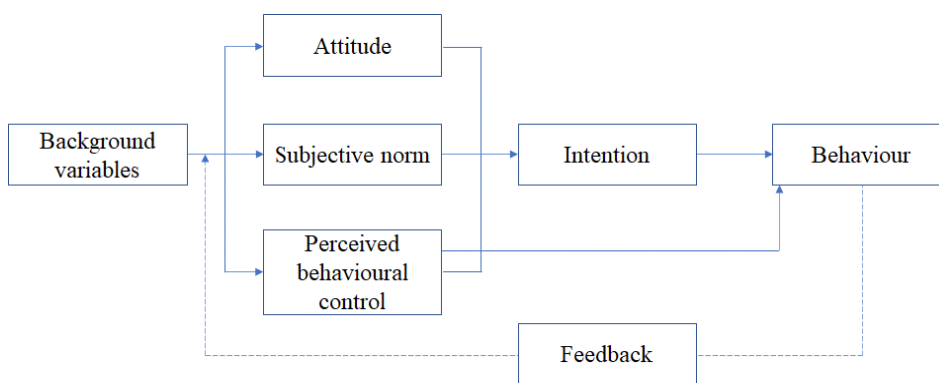


Fig. 1 Theory of planned behavior (TPB)

Accordingly, educational intention could strengthen motivational factors to stimulate the final behavior. In this situation, people became serious and would try hard and maximized efforts in order to best accomplished the behavior (Thomas, 2023). The theory accentuated that perceived behavioral control, together with behavioral intention, could be applied directly to anticipate behavioral achievement. Therefore, for this study, the following were defined and hence brought to the creation of the theoretical framework.

As the most exploited model in psychology, Ayanwale et al. (2023) and Ngonda & Ngonda (n.d.) used TPB to observe the prediction effect of TVET secondary school students' attitudes. In the same way, this study had identified 5 factors of the TVET engineering students under the appropriate behavior variable (a combination perspective on the personal attitudes, subjective norms and perceived behavioral control). In view of that, the predictor variable has an interaction effect by the course delivery variable and ended with the heightened behavior of entrepreneurial intention variable. The following Figure 2 illustrates the model of the study.

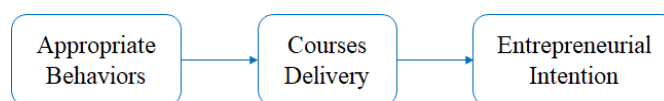


Fig. 2 Research model

In this sense, Shahzad et al., (2021) established that scholars have the tendency to focus on the characteristics of the person involved in entrepreneurial start-ups. In Malaysia, the TVET students have been

equipped with soft skills (Ping Yong & Ling, 2023) and could display certain manners, perceptions, or desires from the entrepreneurship knowledge (Abdullah et al., 2022). A strong desire seems to be the most important element that influences entrepreneurship activities so that one could have passion on his entrepreneurial intention (Murad et al., 2021; Neneh, 2022). The entrepreneurship course must aim to train, improve and polish students' confidence to get ready for the real business later. Utamingtyas (2021) and Acharya (2023) are certain that the entrepreneurial intention becomes clear when the students eventually manage to be involved in new business set-up. This passion is a testament of a deep interest in business. As an entrepreneur, Alameddine et al. (2022), Shir & Ryff (2022), and Hoque & Islam (2022) maintained that hard work and continuous dedication are capable of realizing business ideas. Competencies gained through entrepreneurship course could have both short-term and long-term positive effects. Huang et al. (2021) and Nurjaya et al. (2020) affirmed that success is achieved when students acquired and maintained a high entrepreneurial spirit after practicing (enjoying) the activities. Subsequently, Hahn (2020) anticipated that these students must also demonstrate entrepreneurial skills in order to identify opportunities and run proper business after graduating. The technology entrepreneurship course should be conducted using instructional methods that were guided by business theories and moderated by active (action) learning, giving feedback, and taking actions (Ripollés & Blesa, 2023). As suggested by Chen et al. (2021) and Prifti (2022), the research model (Figure 2) was assessed through blended learning where the active learning was held within 14 study weeks for students to accomplish individual sales and team's business plan activities involving digital marketing strategies. Students could experience the entrepreneurship process including preparation, launching, marketing, sales, and business management as in a real business setting. On the other hand, Schunk & DiBenedetto (2021) translated high self-efficacy into perceived capability upon completion of a course that aimed to improve a student's skills. As such, familiarizing themselves with the entrepreneurship elements is important since entrepreneurs are usually evaluated for their knowledge as well. In this way, the TVET students should display the understanding of entrepreneurial syllabus and exhibit their readiness to do business (Yeap et al., 2021; Murniati et al., 2022). Students were encouraged to perceive the importance of entrepreneurship as their potential career after graduation. Thus, future progress was achieved when their business ideas become an aspiration to confidently make the first sales and generate a profit. In this sense, Gielnik (2015) believed that self-sustainability will be the result of continuous progress where there existed positive feelings in understanding the importance of entrepreneurship.

## 1.2 Research Objective

The objective of the study attempted to investigate the entrepreneurial education effectiveness among TVET students from the Faculty of Engineering Technology at the Universiti Teknikal Malaysia Melaka. As mentioned earlier, the technology entrepreneurship syllabus, pivoted by the course delivery variable, has an interaction effect that needs to be assessed to determine if it has a significant role in enhancing their entrepreneurial intention.

Based on the previous entrepreneurship literatures by Hong et al. (2023), Wiramihardja et al. (2022), Abu Bakar et al. (2022), Othman et al. (2021), Utamingtyas (2021), Husna et al. (2021), etc., the following research questions were raised in answering the objective:

- i. Do students perceive the importance of entrepreneurship course?
- ii. Do students have a business interest?
- iii. Do students acquire sales/marketing skills?
- iv. Do students have business intentions upon graduation?
- v. Do students understand business syllabus?
- vi. Do students receive well course delivery?
- vii. Do students fulfill entrepreneurship intentions?

## 1.3 Problem Statement

Studies by Iwu et al. (2021) and Barba-Sánchez et al. (2022) revealed that there was substantial effort on the conduct of entrepreneurship course for local universities' students. It accentuated administration of the course at the beginning of their programs to enable students to achieve effectiveness. The programs could be improved if necessary to allow for the number of entrepreneurs among students to increase and capable of competing at global level. Nevertheless, Azmi & Zakaria (2023) and Mamat et al. (2023) emphasized that there exists a moderate engagement of entrepreneurial mindset among TVET students under the Ministry of Higher Education Malaysia. This could be due to the difference in terms of its implementation level, influence by family or friends, and how much the students excel in their practical activities.

Hence, the study was driven by the ideas from the Minister of Higher Education that learning institutions should focus more on the key growth factors of graduate entrepreneurs where the TVET universities students provide potential pools as Malaysian workforce. Because UTeM had also upgraded the technology

entrepreneurship syllabus based on the Malaysia Digital Economy Corporation (MDEC) course outline, there is a need for continuous evaluation of its effective implementation on the students.

## 2. Methodology

The study used survey instrument to analyze entrepreneurship conducts among Faculty of Engineering Technology students at Universiti Teknikal Malaysia Melaka. The population involved sixth semester students from two programs (named "C" and "Z") at the university located in Melaka. Using a convenience sampling, participants were selected based on their availability to take part. This way, a faster result was easy to obtain, and the samples were not representative of other non-specified characteristics. Questionnaires have been distributed to a total sample of 108 students where the same number was collected by hand during the last lecture of the semester. Initial descriptive statistics analysis was done on demographic profiling to ensure the study has acceptable variances when conducting investigations on the variables data (Steinberg, 2008), using SPSS and AMOS. The data was gathered from programs "C" (53%) and "Z" (47%), comprising of 61% male and 39% female, consisting of 78% Malay, 11% Chinese, and 11% Indian.

Based on the entrepreneurship course conducted, students' entrepreneurial mindset was perceived from seven associated practical factors as prescribed by Ibrahim (2015) and Seng Te (2019). These included perceive importance, business interest, understand syllabus, sales/marketing skills, intention upon graduation, course delivery, and entrepreneurship intention.

Subsequently, three variables were identified namely students' appropriate behaviors as the independent variable, which was moderated by the course's delivery, and the entrepreneurship intention being the dependent variable as referred to the research model in Figure 1. Reliability, correlation, and regression analysis were conducted using SPSS version 26. Results of model 1 and model 2 of the study were presented in Table 1 to Table 3 to evaluate the effectiveness of the TVET students' appropriate behaviors and whether course delivery has a role as a moderating effect to better the entrepreneurship intention achievement. As explained by Memon (2019), the model 1 described the direct effect of the predictor variables on the dependent variable, while the model 2 clarified how these direct effects and their interaction created moderating effect by strengthening or weakening the direct relationship.

On the other hand, a powerful structural equation modeling (SEM) software, AMOS (Analysis of Moment Structures) version 23, was used to extend standard multivariate analysis methods in particular the standardized regression and the analysis of variance. For the measurement model that involved mediation analysis as in (Figure 4), its outputs summary would enable researchers to easily analyze the variables understudy (Awang, 2018). In this case, the independent variable (appropriate behavior) has a direct influence on the dependent variable (entrepreneurial intention). The third variable exists when it is assumed that there could be an influence of the independent variable on the dependent variable that occurs through a mediating variable (course delivery). So, this is the relationship between these three variables in the model. The test on goodness-of-fit would determine whether the observed data mirrors expected data, samples resemble normal distribution, categorical variables were related, or random samples came from the same distribution. In this regard, Table 5 exhibited the AMOS outputs on the dimensional significance.

## 3. Results and Discussions

On demographic profiling, the results recorded 52.8% and 47.2% respondents from programs acronym as "C" and "Z" respectively. The samples size gathered comprised of 61% male and 39% female, with 78% Malay, 11% Chinese, and 11% Indian. Descriptive analysis revealed 65.8% students preferred to run "own products". As earlier expected, the ministry target of 10% new entrepreneurs from TVET institutions had also been achieved by about 15.7% students (with a prospect of 19.4%) who already taken the step to be the "owned registered business".

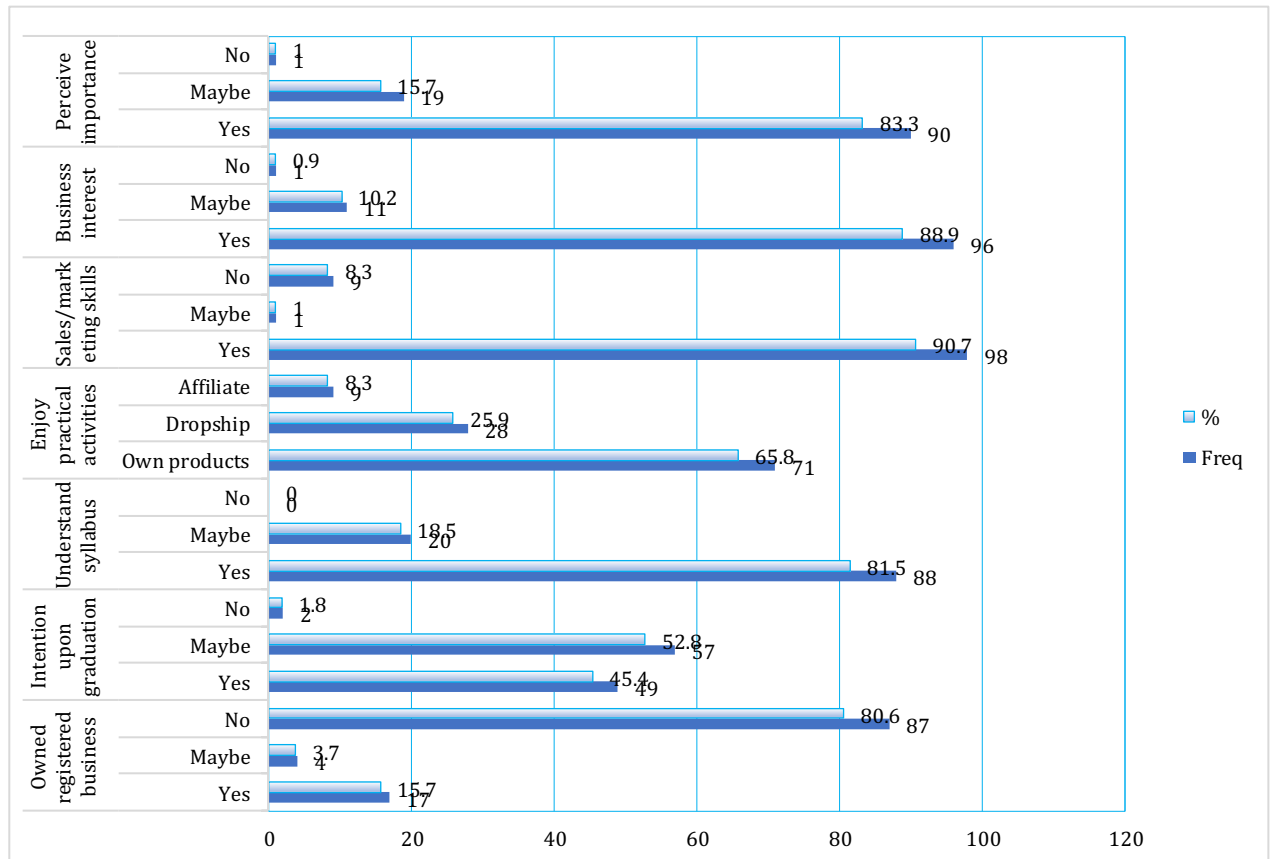
The descriptive analysis outcomes are shown in Table 1. From the results graph in Figure 3, five research variables were used to examine the students' appropriate behavior. Each factor demonstrated was evidence that students' responses were close to 100% (when considered reactions of "maybe"). For detail, they were positive on "perceive importance" by 83.3%, "business interest" 88.9%, "understand syllabus" 81.5%, and "sales/marketing skills" as high as 90.7%. These findings were consistent with previous entrepreneurship study's findings on its impacts (Ibrahim, 2015), aspirations (Seng Te, 2019), and readiness (Sarimah, 2020). On the other hand, it recorded almost half the students or 45.4% who have business "intention upon graduation" with a potential up to 98.2%.

Entrepreneurship education has been successfully implemented and encouraged the TVET students to show off their entrepreneurial practices. The MDEC syllabus has proven effective as it revolves around the latest trend in digital technology. This made it easier for them to perform their product sale activities. The skills in using Facebook, Instagram and Twitter applications have greatly helped the students to market their products as an affiliate or dropship. It exhibited a significant relationship between appropriate behaviors from their blended-

learning and the reaction toward entrepreneurial intention. The sale practice was carried out within a couple of months in which 100% of these students successfully achieved the set sales target. As a result, all the five main factors of students' appropriate behaviors achieved a high percentage of more than 80% as reported above.

**Table 1** Descriptive analysis

Variable	Level	Freq	%
Perceive importance	Yes	90	83.3
	Maybe	19	15.7
	No	1	1
Business interest	Yes	96	88.9
	Maybe	11	10.2
	No	1	0.9
Understand syllabus	Yes	88	81.5
	Maybe	20	18.5
	No	0	0
Sales/marketing skills	Yes	98	90.7
	Maybe	1	1
	No	9	8.3
Intention upon graduation	Yes	49	45.4
	Maybe	57	52.8
	No	2	1.8
Product types	Own products	71	65.8
	Dropship	28	25.9
	Affiliate	9	8.3
Owned registered business	Yes	17	15.7
	Maybe	4	3.7
	No	87	80.6



**Fig. 3** Results graph

The intervention of “course delivery” in the study was further analyzed as moderating and mediating effects, as the possible roles that could further enhance the student’s entrepreneurial intention. A moderation analysis examines the influence of a third variable Z, on the relationship between variables X and Y, under the effect of its occurrence. Specifically, course content (enhancement) can moderate the relationship between appropriate behaviors and students’ entrepreneurial intentions. However, moderators can strengthen, weaken, or reverse the nature of the relationship. Meanwhile in a causal relationship, mediation analysis looks at the extent to which a hypothesized variable X affects a second variable M which in turn affects a third variable Y. The mediation process determines the relationship that exists between the independent variable and the mediating variable, causing indirect effects to occur. In this sense, students with appropriate behaviors can tend to influence entrepreneurial intentions with the mediating effect of course delivery.

### 3.1 SPSS Analysis on Moderating Effect

The reliability test registered Cronbach’s alpha,  $\alpha = 0.55$  for the 5 factors of the students’ appropriate behavior which was moderately reliable. All the 3 variables were well correlated with each other as shown in Table 2. In this sense, appropriate behaviors and course delivery, appropriate behavior and entrepreneurship intention, and course delivery and entrepreneurship intention were all significantly correlated with  $r = .554$ ,  $p < .05$ ,  $r = .396$ ,  $p < .05$ , and  $r = .427$ ,  $p < .05$ , respectively.

**Table 2** Correlation matrix

Variables	1	2	3
Appropriate behaviors	1	-	-
Course delivery	.554**	1	-
Entrepreneurship intention	.396**	.427**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed)

**Table 3** Model summary

Model	R	Change Statistics					
		R Square	R Square Change	F Change	df1	df2	Sig. F Change
1	.468	.219	.219	14.732	2	105	.000
2	.494	.244	.025	3.444	1	104	.047

- a. Predictors: (Constant), appropriate behaviors, course delivery
- b. Predictors: (Constant), appropriate behaviors, course delivery, interaction effect

From Table 3, the R Square Change of model 2 indicated that the moderator role could further explain the variance in the dependent variable by 2.5% more, which was statistically significant ( $p < .05$ ). In other words, the percentage improvement was enhanced by the predictors’ interaction effect ( $R^2 = .244$ ,  $F(1,104) = 3.444$ ,  $p = .047$ ). As such, it could be implied that course delivery did moderate the relationship between appropriate behaviors and entrepreneurship intention.

**Table 4** Model coefficient

Model	Model	Stand. Coeff.	t	Sig.	Collinearity Statistics	
		Beta			Tol.	VIF
1	(Const)		.000	1.000		
	Appropriate behaviours	.229	2.216	.029	.693	1.442
	Course delivery	.300	2.899	.005	.693	1.442
2	(Const)		.000	1.000		
	Appropriate behaviours	.200	1.935	.037	.678	1.476
	Course delivery	.238	2.212	.029	.627	1.596
	Interaction effect	-.178	-1.856	.047	.789	1.267

Dependent variable: entrepreneurship intention

In Table 4, it was evidence that there were significant direct effects for model 1. These direct effects of appropriate behaviors and course delivery were statistically significantly observed respectively, where Beta = 0.23,  $t(105) = 2.22$ ,  $p = .029$  and Beta = 0.30,  $t(105) = 2.90$ ,  $p = .005$ . With similar interpretation, it was also clear that the direct effects for model 2 were both found statistically significant. However, the interaction effect was a bit narrowly achieved with  $t(104) = -1.856$ ,  $p = .047$ . Regrettably, the Beta sign in the interaction predictor is negative. This signifies that interaction by the students' appropriate behaviors and course delivery tend to produce negative effects on the entrepreneurial intent. The course delivery role must be interesting enough to grab students' attention. It may require the syllabus upgrade. In this sense, committed and knowledgeable lecturers shall be preferred to teach entrepreneurship courses to ensure positive effects. Although the teaching plan designed was comprehensive, requiring students to complete four hands-on activities covering 80% of the course total marks, the implementation needs to be more serious. These include business sales, business pitching, business plan, and business portfolio practices that shall provide them with a challenging environment to perform like real entrepreneurs in assimilating a real business experience.

Alternatively, in the first place, significant results were highly induced by descriptive measures of the factors. It was found that the majority of students or 92.6% (SD = 0.263) chose "products" as their venture category. Other than that, the students positively responded by 83.3% (M = 2.82, SD = 0.406) on "perceive importance", 88.9% on "business interest" (M = 4.16, SD = 0.763), "understand syllabus" by 81.5%, (M = 4.25, SD = 0.672), and "sales/marketing skills" about 90.7% (M = 2.86, SD = 0.502). These encouraging outcomes were consistent with previous findings on entrepreneurship impacts (Ibrahim, 2015), entrepreneurship aspirations (Seng Te, 2019), and entrepreneurship readiness (Sarimah, 2020). On top of that, the main contributing factor of the research success could be the 81.5% of the students' enthusiasm to embark on entrepreneurship as a career path when the time is fit. Consequently, the public TVET university has successfully attained 19.4% new entrepreneurs by one of its TVET faculties (as compared to the ministry 10% target).

### 3.2 SEM Analysis on Mediating Effect

The measurement model can be seen in Figure 4 below. SEM-AMOS or in particular Confirmatory Factor Analysis (CFA) was used to validate the factor dimensions.

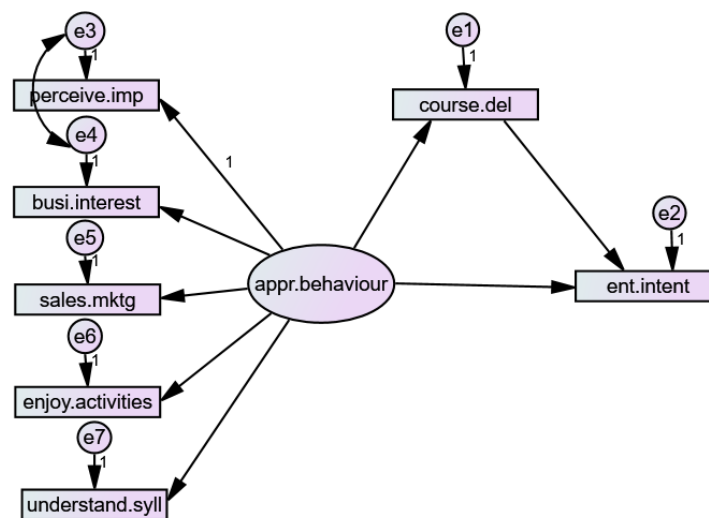


Fig. 4 SEM measurement model

A measurement model shows the relationship between latent variables and their indicators. The model fit is tested by the variables correlation. In SEM, it is possible but not easy to use single-indicator latent variables to obtain an identified model. This is as good as considering observed variables when such a case arises. As shown in Figure 4, a mix of multiple-indicator latent variable and observed variables has formed a structural model. While this is not an uncommon practice, it is also not an issue to use them directly or with no linkage with other latent variables. However, to get a just-identified model, it is important to have the latent factor with three indicators for a model fit assessment.

The CFA uses standardized regression for reporting purposes because the factors score is equal to the factors loading (Awang, 2018). In other words, the effect of the independent variable on the dependent variable could be easily compared. Fornell & Larcker asserted that if AVE is less than 0.5 but composite reliability is higher than 0.6, the convergent validity of the construct can be adequate (Danilo Monteiro, 2020). Meanwhile,



Malhotra argues that AVE is a strict measure of convergent validity because consideration of CR only will conclude that the convergent validity of a construct is adequate, even if more than 50% of the variance is due to the error (Banerjee, 2022).

**Table 5 SEM goodness of fit summary**

Measure	Estimate	Threshold	Interpretation
CMIN	16.229	--	--
DF	12	--	--
CMIN/DF	1.352	Between 1 and 3	Excellent
CFI	0.976	>0.95	Excellent
SRMR	0.071	<0.08	Excellent
RMSEA	0.057	<0.06	Excellent
PClose	0.385	>0.05	Excellent

The SEM outcomes in Table 5 show that the study has achieved all goodness of fit indices. It means the measurement model was capable of reproducing the data. A good-fitting model must be consistent with the data to avoid re-specification. The issue of reliable variance to the indicator is extremely critical. SEM is unique since a good fitting model does not necessarily make it a valid model. An acceptable model can be determined by examining the estimated values of the parameters. Often, the analysis can be achieved by improving the model and preventing specification errors. Kenny (2020) suggested that for a model with less than 200 cases, the chi square test can still be considered as a measure of fit.

For this study, the SEM outputs indicate that all fitness indexes for the model have achieved the threshold level (level of acceptance). Otherwise, an item with low factor loading would indicate that the particular item was useless to measure the construct and therefore not worth keeping it as it could affect the fitness index. Hence, factor loadings can be accomplished by designing factors statements that should not be ambiguous, confusing, repeated, sensitive, biased, etc.

However, Hayes (2018) justified a current method in mediation analysis where the indirect effect between dependent and independent variable paths should inherent a statistical significance and has to be seriously accounted for. Paths of individual variables results have become of less concern because a suppressor effect might be causing the mediating path to be insignificant whereas it is the indirect effect that must be established. This method focuses more on the evaluation of indirect effect significance by examining the product paths of the dependent and independent variables while keeping the path of direct effect controlled. Hence, bootstraps performed 5,000 data samples analysis with a bias-corrected confidence interval set at 95% level.

**Table 6 SEM mediation analysis summary**

Relationship	Direct Effect	Indirect Effect	Confidence Interval		P-value	Conclusion
			Lower Bound	Upper Bound		
Appropriate Behaviors → Course Delivery → Entrepreneurial Intention	0.270	0.167	-0.018	0.330	0.072	No Mediation

In Table 6, the indirect effect in this model has been reported using standardized estimates where it refers to the relationship between the appropriate behavior and the entrepreneurial intent through the course delivery mediation. The results of the bias-corrected percentile give a lower bound confidence interval of -0.018 and an upper bound of 0.330. This exhibits an insignificant indirect effect as these two limits cross the zero value. In addition, a value of 0.072 which is greater than 0.05 was recorded between the intersection of appropriate behavior and entrepreneurial intent based on the two-tail significance level. Therefore, the study confirms that course delivery has no mediating effect between the relationship of appropriate behavior and entrepreneurial intent relationship.

#### 4. Conclusion

Since the alarming economic downturn, entrepreneurial intention being the ministry agenda has become an important topic requiring development of student behaviors in Malaysia. The research literature has linked numerous factors that drive these entrepreneurial prospects among TVET students. Whether such studies were conducted in this country or not, the findings were consistent in showing that entrepreneurial intention should go beyond students who are majoring in business only. On the other hand, it was reported that the entrepreneurship co-curriculum (to nurture appropriate behaviors) has also been participated by engineering students from the public universities. In this context, the Theory of Planned Behaviors was used to identify the

main variables and factors in order to gain a broader perspective of entrepreneurial research. The study found that many TVET engineering students aspire to become entrepreneurs after they graduate. In fact, 19.4% of these students have already owned legal business that exceeded the ministry's 10% target. The personality traits and values managed to influence them to take an early step to start-up a business venture no matter if it is a micro type or just being involved in the dropship or affiliate activities.

Overall, the results indicate that entrepreneurial intention was indeed significant but required the students to be equipped with appropriate behaviors as entrepreneurs that include "perceive importance", "business interest", "understand syllabus", "enjoy practical activities", and "sales/marketing skills". The TVET students from "C" and "Z" programs demonstrated effective trend in entrepreneurship intention. They should acquire the critical appropriate behaviors to brave the multiple challenges created by Industrial Revolution 4.0 and the impact of Covid19 on labor market with their new venture and becoming independent entrepreneurs. It was obvious that lecturers must have solid business knowledge, passion or even background to instill the right entrepreneurial skills and attitudes in the students. Nevertheless, in this study, course delivery by lecturers (although important) was not a critical factor that determines students interest to do business.

The main contribution of the study is the use of hybrid approach on the moderating and mediating effects to check on the role of the course delivery factor using SPSS and SEM analysis respectively. The new start-ups would have a vital role to grow human capital as a way to revamp the nation's economy. Thus, it is suggested that the existing entrepreneurship course be made fully embedded into all TVET programs at the public university to boost students entrepreneurial intention. The findings of this study were important due to the consideration of detailed aspects (appropriate behaviors) that were missing by many previous studies. For further research, suggestions are to include more factors, to take bigger sample size, to consider IT exposure, and to compare multiple universities implementations for generalization purpose. It is also recommended that the student engagement time should be investigated to maximize business practices and several theories can also be applied to get the variables correctly attained to get the outcomes realistic to successfully complete the study.

## 5. Implications

To summarize, this study was successfully conducted to identify the roles of course delivery in achieving the number of entrepreneurs among TVET students majoring in engineering. The results of the study were mixed. It was found that there was a significant relationship between appropriate behaviors and entrepreneurial intention as expected. However, course delivery was not significant in its role either as a moderator or a mediator when tied between the two main variables. This means that the five factors of appropriate behaviors namely "perceive importance", "business interest", "understand syllabus", "sales/marketing skills", and "intention upon graduation" are sufficient to cultivate the entrepreneurial mindset of the students so that they successfully engage as potential graduate entrepreneurs.

The study was very useful because it indirectly examined the effectiveness of the updated MDEC syllabus for the technology entrepreneurship course. It somehow managed to ease the sale practice through digital applications and the Go-eCommerce interface that consequently infused students' genuine interest in the entrepreneurship venture.

In terms of the research method verification, the authors deliberately tested the moderation and mediation effects of the research model using SPSS and SEM-AMOS software respectively. The purpose of doing this comparison is to encourage other researchers to engage in quantitative research analysis. The outcomes explain the consistency of any one method used to validate the data regardless of how the variables relationship is constructed. What matters most is the ability to make realistic decisions in concluding the findings.

In addition, this study faced difficulties in terms of logistics and time where the researcher has to ensure that sales, marketing and reporting practices follow the syllabus that used digital application approaches. Researchers also face challenges in educating the students to understand the concepts and theories of entrepreneurship due to the different orientations of their programs.

For future studies, Universiti Teknikal Malaysia Melaka has taken a new initiative to upgrade the course practices. From the year 2024 onward, students will be involved in real online business. Using the latest and current marketing approach like TikTok, it is hoped that each one of them can register as an affiliate or a dropship to get into the trendy business. The new sales target will be set to ensure that their efforts put will give more profits and return, enhance their entrepreneurial skills and enable just everyone to become self-sustained entrepreneurs while improving economic growth.

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### Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

### Author Contribution

The authors confirm contribution to the paper as follows: **introduction:** Kamarudin, Norun Najjah, Mohd. Khairulnizam; **theory adopted and model development:** Albert Feisal; Mohd. Amin; **methodology:** Kamarudin, Afif Zuhri, Mohd. Amin; **result and discussion:** Kamarudin, Afif Zuhri; **conclusion:** Kamarudin, Norun Najjah, Albert Feisal. All authors reviewed the results and approved the final version of the manuscript.

### References

- Abu Bakar, M. Z., Muhamed, A. A., Hassan, M. F., Halif, M. M., & Abd Rahim, N. N. (2022). The Moderating Role of Entrepreneurship Education on the Relationship Between Entrepreneurial Attitude and Entrepreneurship Intention. *International Journal of Academic Research in Business and Social Sciences*, 12(1). <https://doi.org/10.6007/ijarbss/v12-i1/12157>
- Hong, C. M., Ch'ng, C. K., & Roslan, T. R. N. (2023). Predicting Students' Inclination to TVET Enrolment Using Various Classifiers. *Pertanika Journal of Science and Technology*, 31(1), 475-493. <https://doi.org/10.47836/pjst.31.1.28>
- Husna, I., Rahim, A., & Mukhtar, D. (2021). Perception of Students on Entrepreneurship Education. *International Journal of Business and Social Science*, 12(1). <https://doi.org/10.30845/ijbss.v12n1p13>
- Wiramihardja, K., N'dary, V., Al Mamun, A., Munikrishnan, U. T., Yang, Q., Salamah, A. A., & Hayat, N. (2022). Sustainable Economic Development Through Entrepreneurship: A Study on Attitude, Opportunity Recognition, and Entrepreneurial Intention Among University Students in Malaysia. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.866753>
- Utaminingsyas, A. L. (2021). *Factors That Affect Entrepreneurial Intention Among Universiti Utara Malaysia Students*.
- Bassah, H. (2022). *Nur 'Adnin Syamil The issues and challenges of TVET in Malaysia: from the perspective of industry experts*. <https://tvvet-online.asia/18/the-issues-and-challenges-of-tvet-in-malaysia-perspective-of-industry-experts/>
- Hartono. (2021). *Changing University Students' Mindset: From Job Seekers to Job Creators*. <https://techniumscience.com/index.php/socialsciences/article/view/3026>
- Othman et al. (2021). *Othman et al., 2022. Strengthening The Hei Ecosystem In Producing Graduates Oriented To Entrepreneurial Thinking*. <http://www.ijafb.com/PDF/IJAFB-2022-45-12-22.pdf>
- Subramaniam & Abdul Aziz. (2023). *Governance of TVET in Malaysia: Gaps and opportunities for researchers*. <https://tvvet-online.asia/20/governance-of-tvet-in-malaysia-gaps-and-opportunities-for-researchers/>
- Cui, J., Sun, J., & Bell, R. (2021). The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes. *International Journal of Management Education*, 19(1). <https://doi.org/10.1016/j.ijme.2019.04.001>
- Morris, M. H., & Tucker, R. (2023). The entrepreneurial mindset and poverty. *Journal of Small Business Management*, 61(1), 102-131. <https://doi.org/10.1080/00472778.2021.1890096>
- Yasir, N., Mahmood, N., Mehmood, H. S., Rashid, O., & Liren, A. (2021). Article the integrated role of personal values and theory of planned behavior to form a sustainable entrepreneurial intention. *Sustainability (Switzerland)*, 13(16). <https://doi.org/10.3390/su13169249>
- Yasir, N., Xie, R., & Zhang, J. (2022). The Impact of Personal Values and Attitude toward Sustainable Entrepreneurship on Entrepreneurial Intention to Enhance Sustainable Development: Empirical Evidence from Pakistan. *Sustainability (Switzerland)*, 14(11). <https://doi.org/10.3390/su14116792>
- Hocenski, M., & Juraj, J. (n.d.). *Students' Career Adaptability And Entrepreneurial Intentions: The Mediating Role Of Emotional Regulation And Control*. <https://urn.nsk.hr/urn:nbn:hr:145:531303>
- Ayanwale, M. A., Molefi, R. R., & Matsie, N. (2023). Modelling secondary school students' attitudes toward TVET subjects using social cognitive and planned behavior theories. *Social Sciences and Humanities Open*, 8(1). <https://doi.org/10.1016/j.ssaho.2023.100478>
- Dao, T. K., Bui, A. T., Doan, T. T. T., Dao, N. T., Le, H. H., & Le, T. T. H. (2021). Impact of academic majors on entrepreneurial intentions of Vietnamese students: An extension of the theory of planned behavior. *Heliyon*, 7(3). <https://doi.org/10.1016/j.heliyon.2021.e06381>
- Thomas, O. (2023). Entrepreneurship education: Which educational elements influence entrepreneurial intention? *Industry and Higher Education*, 37(3), 328-344. <https://doi.org/10.1177/09504222221121065>

- Abdullah, W. F. W., Salleh, K. M., Sulaiman, N. L., & Kamarrudin, M. (2022). Employability Skills in the TVET Trainer Training Program: The perception Between Experienced Trainers and Novices Trainers. *Journal of Technical Education and Training*, 14(1), 150–157. <https://doi.org/10.30880/jtet.2022.14.01.013>
- Murad, M., Li, C., Munir, M., Farhan Ashraf, S., Arora, S., & Research, O. (2021). *The influence of entrepreneurial passion in the relationship between creativity and entrepreneurial intention*. <https://doi.org/10.21203/rs.3.rs-177736/v1>
- Neneh, B. N. (2022). Entrepreneurial passion and entrepreneurial intention: the role of social support and entrepreneurial self-efficacy. *Studies in Higher Education*, 47(3), 587–603. <https://doi.org/10.1080/03075079.2020.1770716>
- Ngonda & Ngonda. (n.d.). *Entrepreneurial intentions of engineering students from a South African TVET college*. <https://www.researchgate.net/publication/376617902>
- Ping Yong, B. P., & Ling, Y.-L. (2023). Skills Gap: The Importance of Soft Skills in Graduate Employability as Perceived by Employers and Graduates. *Online Journal for TVET Practitioners*, 8(1). <https://doi.org/10.30880/ojtp.2023.08.01.003>
- Shahzad, M. F., Khan, K. I., Saleem, S., & Rashid, T. (2021). What factors affect the entrepreneurial intention to start-ups? The role of entrepreneurial skills, propensity to take risks, and innovativeness in open business models. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(3). <https://doi.org/10.3390/JOITMC7030173>
- Acharya, R. (2023). *Contextual Factors, Individual Psychological Attributes And Entrepreneurial Intentions Among The Management Students Of Nepalese Universities*. <https://elibrary.tucl.edu.np/bitstream/123456789/18779/1/Full%20thesis.pdf>
- Alameddine, H., Masri, N., Almouchar, M., Mouchar, M., Makdissi, R., & Mekdessi, S. (2022). *The Personal Traits of an Entrepreneur and the Main Factors Leading to Success; Empirical Study on Entrepreneurs in Lebanon*. 24, 28–37. <https://doi.org/10.9790/487X-2411062837>
- Hoque, M. S., & Islam, N. (2022). Leadership Behaviors of Women Entrepreneurs in SME Sector of Bangladesh. *Businesses*, 2(2), 228–245. <https://doi.org/10.3390/businesses2020016>
- Shir, N., & Ryff, C. D. (2022). Entrepreneurship, Self-Organization, and Eudaimonic Well-Being: A Dynamic Approach. *Entrepreneurship: Theory and Practice*, 46(6), 1658–1684. <https://doi.org/10.1177/10422587211013798>
- Huang, Y., An, L., Wang, J., Chen, Y., Wang, S., & Wang, P. (2021). The Role of Entrepreneurship Policy in College Students' Entrepreneurial Intention: The Intermediary Role of Entrepreneurial Practice and Entrepreneurial Spirit. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.585698>
- Chen, L., Ifenthaler, D., & Yau, J. Y.-K. (2021). Online and blended entrepreneurship education: a systematic review of applied educational technologies. *Entrepreneurship Education*, 4(2), 191–232. <https://doi.org/10.1007/s41959-021-00047-7>
- Hahn, D., M. T., B. G., & C. L. (2020). The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective. *Small Business Economics*, 55(1), 257–282. <https://www.jstor.org/stable/48734345>
- Nurjaya, N., Sobarna, A., Affandi, A., Erlangga, H., & Sarwani, S. (2020). Edupreneurship management in shaping the nation's character. *Counselling and Education Journal*, 8(3), 198. <https://doi.org/10.29210/151200>
- Prifti, R. (2022). Self-efficacy and student satisfaction in the context of blended learning courses. *Open Learning*, 37(2), 111–125. <https://doi.org/10.1080/02680513.2020.1755642>
- Ripollés, M., & Blesa, A. (2023). Moderators of the effect of entrepreneurship education on entrepreneurial action. *International Journal of Entrepreneurial Behaviour and Research*, 29(7), 1402–1426. <https://doi.org/10.1108/IJEER-06-2022-0518>
- Schunk, D. H., & DiBenedetto, M. K. (2021). Self-efficacy and human motivation. In *Advances in Motivation Science* (Vol. 8, pp. 153–179). Elsevier Ltd. <https://doi.org/10.1016/bs.adms.2020.10.001>
- Gielnik, M. M., F. M., K.-K. A., W. K. I., K. S., N. M., & D. T. J. (2015). Action and action-regulation in entrepreneurship: Evaluating student training for promoting entrepreneurship. *Academy of Management Learning & Education*, 14(1), 69–94. <https://www.jstor.org/stable/43696665>
- Murniati, D. E., Purwanti, S., Handayani, T. H. W., Harsana, M., Razzaq, A. R., & Rohiat, M. A. (2022). The Influence of Final Project Product Development on Students' Entrepreneurial Motivation. *Journal of Technical Education and Training*, 14(2 SPECIAL ISSUE), 119–132. <https://doi.org/10.30880/jtet.2022.14.02.011>
- Yeap, C. F., Suhaimi, N., & Nasir, M. K. M. (2021). Issues, Challenges, and Suggestions for Empowering Technical Vocational Education and Training Education during the COVID-19 Pandemic in Malaysia. *Creative Education*, 12(08), 1818–1839. <https://doi.org/10.4236/ce.2021.128138>
- Awang, Zainudin. (2018). (2018). *Re: Should I report standardized or unstandardized estimates for EFA in AMOS?*

- Azmi & Zakaria. (2023). *Azmi & Zakaria, 2023. Instructional Elements Assessments of Entrepreneurship Education in a Technical University in Malaysia*.  
<https://ojs.amhinternational.com/index.php/imbr/article/view/3518>
- Barba-Sánchez, V., Mitre-Aranda, M., & Brío-González, J. del. (2022). The entrepreneurial intention of university students: An environmental perspective. *European Research on Management and Business Economics*, 28(2). <https://doi.org/10.1016/j.iemeen.2021.100184>
- Ibrahim, W. N. , B. A. R. , A. S. , M. S. , Z. N. S. (2015). Impact of entrepreneurship education on the entrepreneurial intentions of students in technical and Vocational Education and training institutions (TVET) in Malaysia. *International Education Studies*, 8(12), 141., 8(12), 141.  
[https://www.researchgate.net/publication/284791455\\_Impact\\_of\\_Entrepreneurship\\_Education\\_on\\_the\\_Entrepreneurial\\_Intentions\\_of\\_Students\\_in\\_Technical\\_and\\_Vocational\\_Education\\_and\\_Training\\_Institutions\\_TVET\\_In\\_Malaysia](https://www.researchgate.net/publication/284791455_Impact_of_Entrepreneurship_Education_on_the_Entrepreneurial_Intentions_of_Students_in_Technical_and_Vocational_Education_and_Training_Institutions_TVET_In_Malaysia)
- Iwu, C. G., Opute, P. A., Nchu, R., Eresia-Eke, C., Tengeh, R. K., Jaiyeoba, O., & Aliyu, O. A. (2021). Entrepreneurship education, curriculum and lecturer-competency as antecedents of student entrepreneurial intention. *International Journal of Management Education*, 19(1). <https://doi.org/10.1016/j.ijme.2019.03.007>
- Mamat, S. N., Shamsudin, A., Mohd Pauzi, N. F., Bustamam, K. S., Adanan, S. A., Abdullah Sani, A., & Saidin, A. (2023). Undergraduate Students' Outlook on their Digital Entrepreneurship Readiness, Attitude and Motivation. *International Journal of Academic Research in Business and Social Sciences*, 13(10).  
<https://doi.org/10.6007/ijarbss/v13-i10/19031>
- Memon, M. A. , C. J. H. , R. T. , T. H. , C. F. , & C. T. H. (2019). Moderation analysis: issues and guidelines. *Journal of Applied Structural Equation Modeling*, 3(1), 1–11. <https://jasemjournal.com/wp-content/uploads/2019/10/2019-Memon-et-al-Moderation.pdf>
- Seng Te, T. , A. A. , R. M. A. (2019). Relationship between the selected factors with entrepreneurial career aspirations among students of community colleges in Malaysia. *KnE Social Sciences*, 3(12), 53–64.  
<https://knepublishing.com/index.php/Kne-Social/article/view/4073>
- Steinberg, W. J. (2008). *Statistics Alive! Sage Publications, Inc*.  
[https://archive.org/details/statisticsalive02edstei\\_17u5](https://archive.org/details/statisticsalive02edstei_17u5)
- Danilo Monteiro. (2020). *Low average variance extracted (AVE) for a construct that measures self-reported behavior*. <https://stats.stackexchange.com/questions/tagged/r>
- Hayes, A. F. (2018). (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach (Methodology in the Social Sciences)* (2nd ed.). The Guilford Press.  
<https://www.guilford.com/books/Introduction-to-Mediation-Moderation-and-Conditional-Process-Analysis/Andrew-Hayes/9781462549030>
- Kenny, D. A. (2020). (2020). *Measuring Model Fit*. . <http://www.davidakenny.net/cm/fit.htm>
- Sarimah, C. H. , N. C. H. , S. M. D. , & A. A. K. (2020). The level of entrepreneurial readiness of students at the Institute of Technical Education and Vocational Training (TVET) in Hulu Langat *World Journal of Education (S.I.)*, 2(3), 95–107. <https://myjms.mohe.gov.my/index.php/jdpd/article/view/10729/5032>