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A Decision Tree Approach for Predicting Students Entrepreneurial Intention

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Abstract: The implementation of entrepreneurship education at the Malaysian Institute of Information Technology (MIIT), Universiti Kuala Lumpur (UniKL) could play an important role to develop student entrepreneurial intention. The study aims to explore the students' entrepreneurial acceptance and understand the effect on entrepreneurship education implementation. A survey was conducted to understand the students' entrepreneurial perceptions of entrepreneurship education for different programs in MIIT, UniKL. In order to further investigate the students' perception of entrepreneurship education, this paper analyze the data collected using a decision tree to predict the students' entrepreneurial intention through the exposure of entrepreneurship education. The result shows that entrepreneurial intentions of these students are low, even though they have been exposed to entrepreneurship education modules in MIIT, UniKL. The findings provide some useful insight on students' perceptions of entrepreneurship education and assist for future study to encourage students to venture into entrepreneurship career

Keywords: Decision Tree, Prediction, Entrepreneurial Intention, Entrepreneurship Education.

1. INTRODUCTION

In Malaysia, entrepreneurship has grown importance since 2010 when the Ministry of Malaysia (MOHE) has launched an entrepreneurship program to Higher Institutions (HEI) students. The fiscal yearly budget for 2016, the government has encouraged youth participation in economic and entrepreneurial activities. This is a positive trend for Universiti Kuala Lumpur (UniKL) which has the vision and mission to be a leading entrepreneurial university. UniKL is a private technical university that has various institutes' nationwide focuses in engineering technology. The Entrepreneurship module has been taught in every UniKL institutes with the intention to produce enterprising global Technopreneurs graduates with the necessary capabilities and skills.

Entrepreneurial Intention (EI) prediction is beneficial in providing students' with the supportive process of learning. Identifying the possible outcome of the EI from the predicted results, MIIT UniKL can help transform the outcome of the new sets of students by adjusting the factors that contributed to the past performance.

The objective of the study is to predict students who will show the tendency to become an entrepreneur in the future by using the decision tree methods in the SPSS software. The study will focus on the student perception on the (EE) module, Entrepreneurship Perception and Entrepreneurship Firm Knowledge conducted in MIIT, UniKL. The decision Tree methods has been found to be very competent to generate a comprehensive and precise analysis. Decision tree could be applied in Data Mining (DM) to predict results based on the rules of historical data. SPSS unites the features of DM activities which includes statistical analysis and database . Decision Tree is popular because of the classification rules produce could easily be interpret than other classification methods.

2. LITERATURE REVIEW

The entrepreneurship theory are overlapping between (Ajzen, 1991), (Shapero and Sokol, 1982) and (Krueger, Reilly, and Carsrud, 2000) which state that intentions are determined by attitudes. Individual attitudes usually are affected by exogenous factors such as traits, demographics and support. This implies that intentions serve as important variables between behavior and potential exogenous influence(Krueger et al., 2000). The Models of (Ajzen, 1991) and (Bandura, 1986) explain that Perceived Desirability is moderated by attitudes and perceived Subjective Norms and Perceived Feasibility is moderated by Self Efficacy. However, Self Efficacy attitudes and Subjective Norms are the info processing capabilities which could be developed with EE tools(Bandura, 1986).

An exogenous variable that could affect students' entrepreneurial attitudes and intentions. Understanding the factors that influence EI student profile is critical in

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developing effective policies to encourage entrepreneurial behavior. Therefore, these theories should be further research to understand the EE influence on EI.

EI refers to individual attitudes of actions toward the actions outcome and self-efficacy (Douglas and Fitzsimmons, 2008). EI also correlates with the perceptions of desirability, feasibility and the propensity to act upon opportunities (Shapero and Sokol, 1982) (Peterman and Kennedy, 2003). HEI should develop EE in order to increase students' knowledge and competence for opportunities recognition and exploration (Katz, 2003)(Klandt, 2004)(Davidsson and Honig, 2003). Many researchers have emphasized that the growing interest of students in entrepreneurship are related to EE as one of the exogenous factors contributing in influencing the students' entrepreneurial awareness and mentality (Fayolle, Gailly, and Lassas-Clerc, 2006)(Garalis, Strazdien, and others, 2007)(Lee, Chang, and Lim, 2005)(Peterman and Kennedy, 2003).

Entrepreneurs with academic EE could perform better (Shane, 2004) and have higher employability than their non-academic counterparts (DA Zilz and Scott, 2004). The reasons could be that ordinary reduces entrepreneurial risk taking attitudes, students are prepared for the demands of established organizations and secure career, EE has the primary focuses on entrepreneurial attitudes and skills(Bae, Qian, Miao, and Fiet, 2014) (Bakoti and Kruži, 2010)(Linan, 2008).

This study believes that EE is linked closely to EI; therefore this is the focus of the study. The gap in knowledge provides the motivation to further evaluate how EE influence the EI of the students in MIIT, UniKL.

3. RESEARCH HYPOTHESIS

The curriculum in UniKL was developed to focus towards producing enterprising global Technopreneurs. Therefore, the hypothesis of this paper is:

H1: The incorporation of EE module into engineering technology curriculum will have a positive impact on the technical engineering students' toward building entrepreneurial intention.

The factors that contribute to students' entrepreneurial intention discussed in this paper would lead UniKL to further evaluate whether the current curriculum is significant in producing students' that aligned with UniKL mission and vision.

4. RESEARCH METHODOLOGY

4.1 Data Collection Tool

The study was conducted in Universiti Kuala Lumpur, Malaysian Institute of Information Technology (MIIT, UniKL). The data were collected through questionnaires and was distributed to two different courses of bachelor students: Bachelor in Multimedia Technology (BIMD) and Bachelor in Computer Entrepreneurial (BCEM).

The questionnaire was adapted and customized from (Liñán, Rodrıguez-Cohard, and Rueda-Cantuche, 2011) and respondents were required to answer the questions by using a 5 point Likert scale. The sample was taken from BCEM and BIMD students from semester 4 and 5 who have taken EE modules. The factors considered in the prediction for this paper are Entrepreneurship Module, Entrepreneurial Perception and Entrepreneurial Firm Knowledge components. These students were selected because the students are about to finish their studies and are going to face their professional career choice.

Factor	Description
Entrepreneurial Intention	Intention to become an entrepreneur
Entrepreneurship Module	Taken entrepreneurship module
Entrepreneurial Perception	Entrepreneurial social valuation
Entrepreneurial Firm Knowledge	Intention to start a firm and become an entrepreneur

Table-1: Factors for prediction

Factors considered for predicting EI of the students in **(Table-1)**.

a. Entrepreneurial Intention refers to the students' have shown interest to further involve in the entrepreneurial career path.
b. Entrepreneurship Module refers to the students' involvement with (EE) module conducted in MIIT, UniKL.
c. Entrepreneurial Perception refers to the students' enthusiasm on the involvement with entrepreneurial activities.
d. Entrepreneurial Firm Knowledge refers to the students' intention goals to create a firm.

The Entrepreneurship Module, Entrepreneurial Perception and Entrepreneurial Firm Knowledge factors in **Table-1** consist of a few items as shown in **Table-2**.

Factor	Item
Entrepreneurship Module	a. Knowledge about entrepreneurial environment b. Greater recognition of the entrepreneur's figure c. The preference to be an entrepreneur d. The necessary abilities to be an entrepreneur e. The intention to be an entrepreneur
Entrepreneurial Perception	a. Entrepreneurial activity clashes with the culture in my country b. The entrepreneur role is not sufficiently recognized c. Many people consider hardly acceptable to be an entrepreneur d. Entrepreneurial activity is considered too risky to be worthwhile
Entrepreneurial Firm Knowledge	a. I am ready to be an entrepreneur b. My professional goal to be an entrepreneur c. I will make an effort to start and run my own firm d. I am determined to create firm in the future

Table 2: Distribution on the component of the factors for prediction

4.2 Decision Tree - CHAID

The Decision Tree method is designed to examine a set of predictor variable. The splitting accomplishment of the data set into groups is to improve the prediction of a target (dependent) variable. The Decision Tree partition the data set based on the relationships between a target variable and predictor variables. The result will show which predictor variables are strongly related to target variable. The difference between statistical prediction method such as regression or discriminant analysis is the prediction equation involve with fitting a model to a data, estimating parameters and evaluating fit on the data.

Therefore, the Decision Tree method is to find the best single predictor of the dependent variable at the root of the tree. Finding this predictor usually involves grouping together several of the original values of the predictor to create at least two nodes. Each node will define a new branch of the tree that is being created and the process will repeat itself within each branch to look for best predictor and create at least two nodes with the best predictor. The process will stop growing when no predictor can be found to improve the accuracy of prediction(Veitch, 2004).

In this study, Chi-square Automatic Interaction Detection (CHAID) was chosen to predict the EI of the students. CHAID is a heuristic tree based statistical method that examines the relations between many categorical, ordinal or continuous predictor variable that are grouped into ordered categories and into categorical target measure.

Originally CHAID was designed to handle nominal attributes only. For each input attribute ά, CHAID finds the pair values in V_1 that is least significantly different with the target attribute. A statistical test conducted usually depends on the type of target attributes with ρ value. Therefore, if CHAID target attribute as listed in **(Table-1)** then the following test will be conducted as follows: (Rokach and Maimon, 2005).

Table 3: CHAID test depending on the target attributes

Target Attribute	Test
Continuous	F test
Nominal	Chi-square test
Ordinal	Likelihood ratio test

5. RESULTS AND DISCUSSION

The EI was analyzed using predictive Decision Tree in Statistical Package for Science (SPSS) program. The SPSS predictive approach selected is CHAID. In **(Table-1)**, the dependent variable is the Entrepreneurial Intention (EI) which indicates that the study is concerned with predicting students EI. The influence factors of EI are listed under the independent variables as Entrepreneurship Module and Entrepreneurial Perception. The component items for each factor are illustrated in **(Table-2)**.

(Fig. 1) illustrate the Decision Tree on predicting students' with EI. The EI result implies on the number of students who have shown interest to become an entrepreneur. The result shows that 69.1% have EI and 30.9% have no EI. The next factor for consideration is the entrepreneurial perception, the results shows that 38.3% do not believe in entrepreneurial career and 30.9% will consider pursuing entrepreneurial career in the future. This shows that 30.9% will likely tend to venture into an entrepreneurial career in the future.

Table 4: Model Summary

Specifications	Growing Method	CHAID
	Dependent Variable	Entrepreneurial Intention
	Independent Variable	Entrepreneurship Module
		Entrepreneurial Firm Knowledge
		Entrepreneurial Perception
	Validation	None
	Maximum Tree Depth	3
	Minimum Cases in Parent Node	100
	Minimum Cases in Child Node	50
Results	Independent Variables Included	Entrepreneurship Module
		Entrepreneurial Perception
	Number of Nodes	5
	Number of terminal Nodes Depth	3
		2

Table 4 shows the summary of the CHAID model. The dependent variable is Entrepreneurial Intention and the Independent variables are Entrepreneurship Module, Entrepreneurial Firm Knowledge and Entrepreneurial Perception. However, the results compiled by the Decision Tree CHAID have chosen Entrepreneurship Module and Entrepreneurial Perception variables have the close influence on the EI of the students.

Table 5: Gain Summary Nodes (Growing Method: CHAID, Dependent Variables: Entrepreneurial Intention)

Node	N	Percent	Mean
3	50	30.9%	0.8400
4	62	38.3%	0.3871
1	50	30.9%	0.2400

Table 5 illustrates the summary on the gain nodes in the predictive decision tree structures. The node four has a higher gain of 38.3% from the other two nodes. The result indicates that the influence level of the fourth node factor contributes to the predictive EI analysis of the students. The node three results indicate that only 30.9% do not have intention to build an entrepreneurial career in the future. Therefore, the study shows that only a small group of students, 38.3% has shown interest with an entrepreneurial career.

The Decision Tree for predicting the students' with EI is further illustrated in **(Fig-1)**. The EI was based on the number of students who have shown interest to become an entrepreneur. The result shows that 69.1% have EI and 30.9% have no EI. The next factor for consideration is the entrepreneurial perception, the results shows that 38.3% do not believe in entrepreneurial career and 30.9% will consider pursuing entrepreneurial career in the future. This shows that 30.9% will likely tend to venture into an entrepreneurial career in the future.

6 CONCLUSION

The research has shown that EE have not much influence on the EI of the students' who studies in MIIT, UniKL. Only a small group of students who took EE in MIIT, UniKL are inspired with the intention to pursue careers as an entrepreneur.

However the study has some limitations, further research should be conducted to overcome the limitations that were not covered in this study.

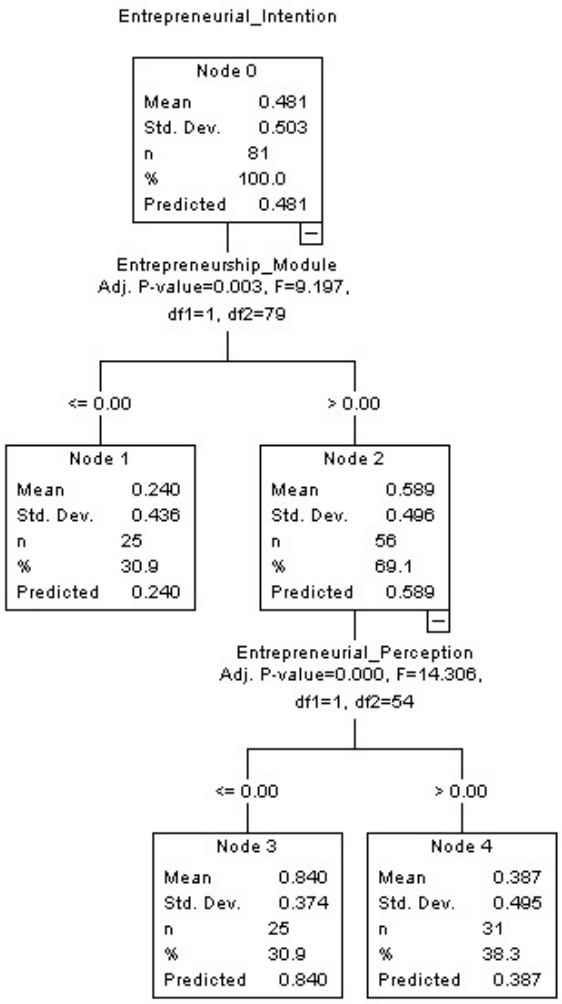


Fig-1: Decision Tree structure in predicting Students' Entrepreneurial Intention

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