Factors Influencing High School Students' Decision in Eastern Economic Corridor area (EEC) to Choose Vocational School over University: Binary Logistic Regression Analysis

Jeerayu Khowchernklang[*]**, Charoonsri Madilokkovit and Pruet Siribanpitak**

Department of Educational Policy, Management, and Leadership Faculty of Education, Chulalongkorn University, Bangkok 10330, Thailand

[*]**Corresponding author's e-mail: jeep@willbite.co**m

Abstract

The aim of this paper is to shed light on the influential factors that influence high school student's decision to choose vocational education over university among students in Eastern Economic Corridor area (EEC). The objectives of the research were to explore their education decision after graduation and to analyze the influential factors affecting their decision for the students who chose vocational education after high school instead of university. This research was conducted among 904 high school students in EEC area who were choosing their higher education in the last semester of the academic year (2020). The research tool was a survey questionnaire and the statistics applied were the frequency, percentage as well as a Binary Logistic Regression which was employed to analyze the significance of key influential factors.

The research revealed that most students chose the university for 75%, vocational college for 14% and only 7% chose not to study after high school. For students who chose vocational college, the results showed that the influential factors affecting their decision is a labor demand signaling both area-based demand for labor in EEC area and industry-based demand which is the demand for labor in S-Curve & New S-curve industries. While gender and dual degree offers for vocational college also affect student's decision to vocational education as well. The prediction accuracy for the students was 86.6%. These research findings can be used as a guideline to promote and encourage students to study further in vocational education that has already become an excessive demand in the EEC labor market.

Keywords: EEC, Vocational education, Demand for education, Demand for labor, Binary logistic regression

Background and signification of the research problem

The Eastern Economic Corridor area or EEC is an area-based development initiative initially focused on the 3 Eastern provinces, namely Rayong, Chonburi, and Chachoengsao. The EEC development plan envisages a significant transformation of both physical and social development, plays an important role as a regulatory sandbox uplifting the country's competitiveness.

To achieve the economic area-based development goal, a human capital is a crucial factor to support the growth of the investment in each target industry in EEC. However, there is a Manpower demand in the 10 target industries (S-curve and New S-curve) in the EEC showed that 475,668 job positions for skilled workers would be needed during the five years from 2019-2023. Among these positions, 53.2 percent would be vocational education-level workers (Ministry of Education Thailand, 2020).

Since vocational education plays a crucial role in producing skilled workforce that are needed by major industries in EEC. Therefore, the educational institutions in the EEC area must speedily produce vocational education-level manpower and reduce losses from over-supplied bachelor's degree manpower especially some fields that no longer cater to the industries' demands. Nevertheless, the barrier of supplying sufficient manpower or workforce to the EEC is a comparatively low number of students who go to vocational institutions. This might cause from lower demand for education in vocational education after completing secondary education or high school since they are more likely to continue their studies in the university or bachelor's degree than vocational education.

Therefore, there might be a threat of EEC and related stakeholders in the future if they could not expand the size of vocational manpower production in the area which might lead to excessive demand for vocational education and oversupply for bachelor's degree holders. For post-high school education, students who want to continue their higher education would have choices to make. Bachelor's degree education is a typical choice for high school students whereas vocational education seems to be less desirable alternative among Thai high school students but there are minor group of them to choose to pursue vocational education.

There are various possibilities when discussing the educational choice process. In other words, educational choices can be considered as sequential decisions: the choice is "whether" or "whether not" to choose a particular education. In situations such as this, in which the outcome variable is dichotomous, classic regression is not the most appropriate econometric method, since its optimum properties are based on assumptions that stop being valid when the outcome variable is qualitative. Therefore, the binary logistic regression or the logit model can predict the probability that an option will be chosen. In practice, this requires that the explanatory variables we use adequately reflect the most important determining factors in the educational choice.

Therefore, if we can understand the driving factors for high school students who choose the choice of vocational education over the choice of bachelor's degree. It would be beneficial for policymakers or stakeholders as they can adopt some insights into the necessity of general

policy frameworks to prepare high school students in the EEC area for a successful entry into the labor market.

From literature review, there are various factors have been identified in both theoretical and empirical literature as potential determinants affecting the decision for higher education. These variables can be broadly categorized into four main group which are demographic, social, economic, and institutional variables. Demographics is the major driver of aggregate demand for higher education such as sex, age, and family (Goyette & Mullen, 2006). The second class of potential demand determinants includes social variables (Wang, 2013). For the economic factors includes both microeconomic (cost of education) level or a macroeconomic level such as a labor demand, employment rate and future income can also trigger intention to study higher level (Gölpek, 2014). Also, the institutional factors such as reputation and are also important for students' selection as well (Cheevapruk & Chantuk, 2018).

Binary logistic regression is applied to use as a technique to cope with limitations of Ordinary Least Squares (OLS) regression in handling dichotomous outcomes (Cepar & Bojbnec, 2012). Binary logistic regression model has become the effective method of data analysis in many disciplines that can formulate models sorting the factors that might determine whether or not an expected outcome happens, and the model can be applied to predict likelihood of the outcome of observation including medical research and social research including the market research and educational research. The finding from the studies can apply to use for a policy formulation, strategic direction and for further research in related fields. This research will also apply the binary logistic regression to analyze the factors affecting the high school student's decision which can also apply for predicting the likelihood of students' choice to choose vocational education in the future (Daguplo, 2017).

Objectives

1. To study high school students in EEC's education choices after graduation.

2. To analyze the influential factors affecting their decision for students in Eastern Economic Corridor area (EEC) who choose vocational college after high school.

Scope of research

1. Scope of the population

The population of this study is a high school student in their year (Matthayom 6) of academic year of 2020 and their schools are in EEC area.

2. Scope of the area

This research is a study in the Eastern Economic Corridor area (EEC) coastal area covering 3 provinces, namely Chonburi, Rayong and Chachoengsao.

Research methodology

1. Data collection methods

The survey method was used to collect primary data for this research. The total number of populations is 43,430 and multi-stage random sampling was applied with the quota of 300 respondent per province (3 provinces in EEC area = 900 targeted respondents). The questionnaires were distributed to high school students from the schools that had been qualified and selected by the office of the basic education commission as the representative schools for EEC development. For the sample of students, they were in their last year of high school who were choosing between vocational education or undergraduate level at university after their graduation in the academic year of 2020.

A total number of 904 completed questioners were acquired. The data received from the survey indicate that the largest of respondents in EEC is from Chonburi (53%), Chachoengsao (32%), Rayong (15%).

There were 830 students decided to pursue further degree (89%). The majority of students (717, 79%) chose to study for undergraduate degree or bachelor's degree in the university while 113 students (13%) decided to continue in vocational education and the rest of the students chose not to continue education for now (7%) and occupational education (1%).

Table 1 Percentage of students choosing vocational education and university education

Province	Vocational education	%	University education	%
Chachoengsao	10	9%	266	37%
Chonburi	65	58%	361	50%
Rayong	38	33%	90	13%
Total	113		717	

Source: Author's Study

The questionnaires comprised closed and open-ended questions which were designed to be 3 parts; the first of which includes demographics-based questions about the respondent's province of origin, the current province of studies, gender, GPA, the intended choice of studies after graduation. The second part of the survey consists of questions about factors influencing the choice education, and this part used five - point rating scale (1 = strongly disagree/ least important, 5 - strongly agree/most important). And the last part was the open-ended questions about educational suggestions and desirable education they want to have apart from vocational and university education.

2. Data analysis

The study used logistic regression for predicting the likelihood of respondents' choice between two outcome categories of 'choosing vocational college' or 'choosing university' after graduate from high school.

The binary logistic regression output was generated using 'choosing vocational college' or 'choosing university' as dependent variables and explanatory variables are as following:

1. Sex (SEX)
2. Academic performance in high school/GPAX (GPA)
3. Parental support (PRS)
4. Influence from friends (FRD)
5. Expenses/Fees for education (EXP)
6. Job opportunity after graduation (JOB)
7. Expected income after graduation (INC)
8. Labor market acceptance after graduation (LBR)
9. Demand for labor in S- Curve, New s-curve industries (SNS)
10. Demand for Labor in EEC area (EEC)
11. Ability to get acceptance to the college/university (ABL)
12. Experience in the field (for the selected program) (EX)
13. Reputation of the institution (RPT)
14. Dual degree program (DUAL)
15. New generation undergraduate program (NEWG)
16. Financial support/Scholarship (FNS).

In the Logit model 'choosing vocational college' is coded as 1, whereas "choosing university" is coded as 0.

$$P(Y = 1) \quad = \quad \frac{1}{1 + e^{-X\beta}}$$

when $P(Y = 1)$ is the likelihood of choosing vocational education.

e = Natural Logarithm (e $\cong$ 2.71828)
X = Dependent variable
β = Coefficient

For preliminary analysis, reliability analysis by using Cronbach's alpha scheme was used to measure the reliability of a set of factors and questions in a survey instrument (Cronbach's alpha=0.8). Also, all of these variables were verified by three qualified experts, who are specialized and having experiences in the field of econometric and educational research, based on the technique of content validity using Item Objective Congruence (IOC) index.

The framework of this study assumes that intention to choose vocational education is based on explanatory variables as the shown figure.
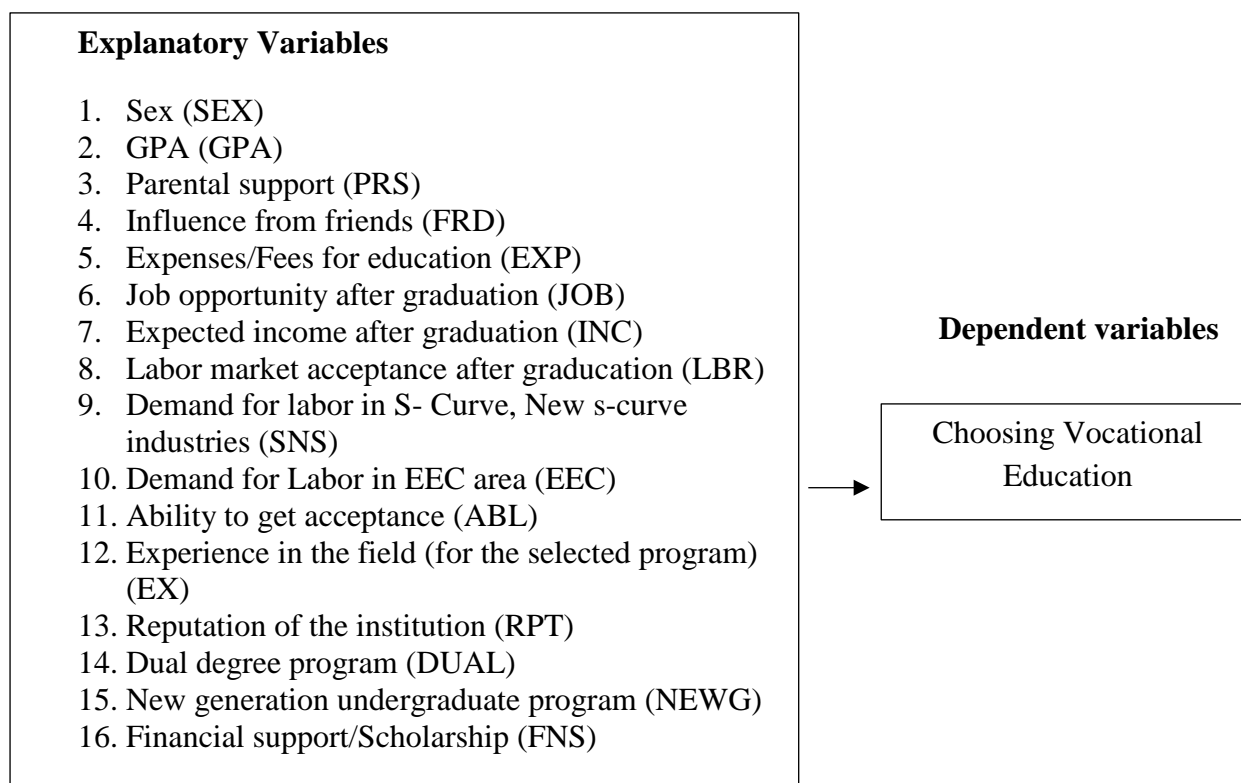
Explanatory Variables

1. Sex (SEX)
2. GPA (GPA)
3. Parental support (PRS)
4. Influence from friends (FRD)
5. Expenses/Fees for education (EXP)
6. Job opportunity after graduation (JOB)
7. Expected income after graduation (INC)
8. Labor market acceptance after graducation (LBR)
9. Demand for labor in S- Curve, New s-curve industries (SNS)
10. Demand for Labor in EEC area (EEC)
11. Ability to get acceptance (ABL)
12. Experience in the field (for the selected program) (EX)
13. Reputation of the institution (RPT)
14. Dual degree program (DUAL)
15. New generation undergraduate program (NEWG)
16. Financial support/Scholarship (FNS)

Dependent variables

Choosing Vocational Education

Figure 1 Framework

Results

As being mentioned previously, this study used logistic regression analysis to identify the factors that affect enrollment decisions of high school students in EEC and uses these variables to classify prospective students into choosing vocational education and bachelor's degree education. The proportion of respondents were female (75%) and male (25%). The province they currently live in are Chonburi with 53% of respondents, Chachoengsao 32% and Rayong 15%.

The results from the survey revealed that majority of students chose to study in bachelor's degree education for 79% following by 14% of students who chose to change to study in vocational education and only 6% decided not to continue to study for now. However, in the binary logistic regression analysis when screened only those students who chose to continue studying after high school to be a sample group for logistic regression. To Identify the variables to be Included in the Model, Omnibus test was applied to test the model coefficients as following table.

Table 2 Omnibus test for model coefficients

Omnibus tests of model coefficients		Chi-square	df	Sig.
Step 1	Step	79.187	20	0.000
	Block	79.187	20	0.000
	Model	79.187	20	0.000

Source: Author's Study

Table 2 shows the omnibus test of model coefficients. The significant level is less than 0.05 (p-value of 0.000 displaying a chi-square of 79.187) that means that the variables combined in a model will succeed in this prediction. In other words, the model is a good fitting model or statistically significant according to Omnibus Test Model.

Table 3 Model Summary (Goodness of Fit)

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	581.331	0.531	0.766

Source: Author's Study

Cox and Snell's R square in Table 3. is based on the log likelihood for the model compared to the log likelihood for a baseline model. Nagelkerke's R square (Psudo R2) is an adjusted version of the Cox & Snell R-square that adjusts the scale of the statistic to cover the full range from 0 to 1. The Cox and Snell R Square value is 0.531 and the Nagelkerke R Square value is 0.766. This means that the dependent variable (choosing vocational education) can be explained by the explanatory variables of 76.6% while the remaining 23.4% is explained by variables outside the research model.

Table 4 Hostmer and Lemeshow Test

Hostmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	16.011	8	0.052

Source: Author's Study

Table 4, shows Hosmer and Lemeshow Test that is a test of Goodness of fit test, which is a test to investigate whether the model is correct or not (whether the model is appropriate). It is said that if there is no significant difference between the model and the observation value,

there can be no difference between the observation result and the possibility of the model prediction result.

Hypothesis used:

H_0: The model is appropriate (there is no significant difference between observation result sand the possibility of model prediction)

H_1: The model is not suitable (there is a significant difference between the observation result and the possibility of predicted model)

Significant level: $\alpha = 0.05$ and will accept H1 if p-value less than α

This model has the significance value equal to 0.052 (> 0.05) so accept H_0, indicating that the model can be accepted and hypothesis testing because no significant difference between model with the value of his observations.

Table 5 Classification table generated by the logistic regression model

			Classification table		
			Predicted		
	Observed		**Student's decision**		**Percentage correct**
			University	**Vocational**	
Step 1	Student's decision	University	715	2	99.72
		Vocational college	109	4	3.54
	Overall percentage				83.5

Source: Author's Study

From Table 5, overall percentage of 83.5%, which means the accuracy of this model is 83.5%. A value of 83.5% can also be given the meaning that this logistic regression equation model can predict education decision made in vocational college choice and university choice in overall.

Table 6 Coefficient estimates of the variables included in the logistic regression model

	Variables in the equation					
	β	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
SEX(1)	1.245	0.224	30.972	1	0.000***	1.245
PRS	-0.046	0.120	0.146	1	0.702	-0.046
GPA1	0.462	0.686	0.455	1	0.500	1.588
GPA2	-0.516	0.421	1.505	1	0.220	0.597
GPA3	-0.059	0.392	0.023	1	0.880	0.943
GPA4	-0.573	0.430	1.777	1	0.183	0.564
FRN	-0.113	0.095	1.407	1	0.236	-0.113

	β	S.E.	Wald	df	Sig.	Exp(B)
			Variables in the equation			
EXP	0.026	0.129	0.042	1	0.837	0.026
JOB	-0.106	0.219	0.234	1	0.629	-0.106
INC	-0.182	0.216	0.711	1	0.039	0.182
SNS	3.85	0.230	2.817	1	0.001***	3.85
EEC	1.44	0.216	0.445	1	0.003***	1.44
ABL	0.110	0.197	0.311	1	0.577	0.110
ENT	-0.364	0.195	3.494	1	0.062	-0.364
EX	-0.117	0.161	0.528	1	0.467	-0.117
RPT	-0.472	0.151	9.767	1	0.002***	-0.472
DUAL	0.514	0.206	6.238	1	0.013**	0.514
NEWG	0.307	0.206	2.219	1	0.136	0.307
FNS	-0.343	0.149	5.329	1	0.521	-0.343
Constant	-3.212	0.632	25.836	1	0.000***	-3.212

Source: Author's Study * $p < 0.1$, ** $p < 0.05$, $p < $ *** 0.01

The variables in Table 6, has shown several important elements. The Wald statistic and associated probabilities provide an index of the significance of each factor or predictor in the equation. The Wald statistic has a chi-square distribution which can be accessed by considering the significance values and if the value is less than 0.05 then the null hypothesis is rejected as the variable does make a significant contribution. But if the value is more than 0.05 then it is considered as not significant by Wald statistic, therefore those factors can be dropped. The result shows that the variables fall within the acceptable range are SEX(1 male), SNS, EEC, DUAL and RPT.

Considering β coefficient of each the significant variable with positive value (+), the results for variable SEX(1 male) suggests that male students are more likely to choose vocational education than female students .While SNS and EEC variables with the positive value (+) which indicates that students who are aware of the information about demand for labor in S-curve/New S-Curve industries and the demand for labor in EEC area would have higher probability of choosing vocational education over university. In addition, the variable DUAL with the positive value (+) also points out that the student who are informed about the dual degree for vocational program are more likely to choose vocational education over the university as well.

On the other hand, for the significant variables with the negative (-) value of the β coefficient, the result also shows that RPT is statically significant which implies that the perception towards a reputation of vocational school is significantly associated with a lower probability of choosing vocational education.

In sum, SEX (1), SNS, EEC and DUAL variables are statistically significant with positive coefficient which implies that for every unit in each significant variable, there is an

expected increase of 1.245, 3.85, 1.44 and 0.514 in the log odds of student's decision choosing vocational education, holding all variable constant. While RPT with negative coefficient indicates that for every unit in each variable, there is an expected decrease of 0.472 in the log odds of student's decision choosing vocational education, holding all variable constant as well.

Conclusion and discussion

The binary logistic regression model suggested that five variables which are sex, labor demand, demand of manpower in S-curve and New s-curve industries and dual degree program for vocational education and institution's reputation were significantly associated with the choice of students in choosing their vocational education. Best on the findings, we can assume that the predictors of the students' decision in choosing vocational education can be shown in the equation below.

$$z = -3.212 + 1.245(SEX\ 1) + 3.85SNS + 1.44EEC + 0.514DUAL - 0.472RPT$$

The prediction from the equation suggests that gender has a positive impact in choosing vocational education after high school. And male students are more likely to choose vocational education than female students which could be the reason of being male-dominated environment in the school and there was a substantial disparity in the wages earned by female and male vocational after graduation (Thurtle et al., 1998; Frome et al., 2006). Whereas having a dual degree program (DUAL) offered by vocational education also has some impact on a decision to choose a vocational education as the leaners could have more career options to choose after graduation with the dual degree.

In terms of macro factors, labor demand in S-Curve & New S-curve industries as well as the demand for labor in EEC have positively impacted on the decision to choose vocational education for high school students as the students are aware of a future employment. Since the information about labor market outcomes or labor market acceptance such as salary and a chance of getting a job play a crucial role in the college students' decision (Wiswall & Zafar, 2015).

On the contrary the factor of institutional reputation has a negative impact for students in selecting vocational school. Evidence of this can be found in the literature on a negative image of vocational students portrayed through various media channels that stereotypes them as violent, poor, and unsuccessful and this picture is reproduced and embedded throughout society that unavoidably affects the reputation of vocational institution. This makes it harder for school to attract prospective students by a negative image and reputation (Tarat, 2020).

Policy suggestion

Vocational education will play an important role in driving the development of EEC and 10 industries (S-curve and New S-Curve). Educational institutions and EEC HDC (EEC Human Development Center) should strategically plan together to attract more prospective students to attend vocational education, not just secondary graduate students (M.3) but should

also attract high school graduates (M.6) as well in order to respond to the manpower demand in EEC area that keeps increasing gradually every year.

The findings of the study discovered the major factors considered by high school students when making choices to study in higher degree. This will enable the vocational institutions to encourage potential students to attend vocational college more by highlighting the importance of labor demand information in the EEC area and the demand in the targeted industries in order to guide and persuade the prospective students to make a choice of choosing vocational education.

In addition, in order to positively encourage prospective high school students to choose vocational education, high schools and vocational college should both take a role in giving manpower demand information for both area-based (EEC) and industry-based (S-Curve and New S-curve), for instance, up-to-date information on labor market demand statistics and job opportunity after graduation for each level of education especially for vocational degree of education. This finding complements prior research which identified labor demand signaling can be a trigger to motivate student to pursue a STEM degree in college (Crisp et al., 2009).

For the negative image of vocational college that has been being stereotyped for a long time as being more violent and less successful than general education (Tarat, 2020) or university level which unavoidably causes hesitation among prospective students especially female to choose vocational college. Thus, the stakeholders and educational institutions urgently need to have a campaign to change and uplift a positive perception via gender inclusive activities and reputation building educational campaign through related activities such as open house and vocational camp activities etc.

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