A Study of the Termination of Undergraduate Students Status in the Faculty of Science and Technology, Thammasat University, Thailand

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Abstract
The objectives of this research were to study the survival function, median survival time, and hazard function of the termination of undergraduate students in the Faculty of Science and Technology, Thammasat University, Thailand. Moreover, we aim to compare the survival time of termination of student status classified by curriculum, gender and domicile. Secondary data of 624 students were collected by the office of Registrar, Thammasat University. The research results showed that the undergraduate students of the Faculty of Science and Technology had the highest risk of termination of student status equal to 0.18 in the second semester of the 1st Year. This may be caused by students dropping out to take entrance examinations at other universities because they received a cumulative grade point average lower than the level specified by the university. Some students did not like their field of study. Finally, when boredom occurs, they use the method of changing their field of study or changing universities. The median survival time could not be determined because there were no cases where half of the students lost their status during the study period. When comparing the survival time of termination of student status classified by curriculum, gender and domicile. It can be found that students in each curriculum had a significant difference in the survival time of termination of student status (P-value = 0.005). Male and female students had no difference in survival time of termination of student status (P -value = 0.393) and students residing in Bangkok and other provinces had a significant difference in the survival time of termination of student status (P-value = 0.034).

Keywords: Termination of Student Status, Survival Analysis, Thammasat University

Introduction

The termination of student status means an event in which a student has to leave the university before graduation. It is considered a "Wasting investment in education" because the education a budget comes from the people's taxes. Thailand allocates budget for education at a high rate and it is expected that in the future it will continue to increase, while the quality of the output of the education system continues to decline. In addition, the termination of education also causes losses in other areas such as loss of expenses, people, and materials for education. And most importantly, it is discouragement, wasted opportunities, and wasted time. Therefore, universities need to focus on developing and improving education management to have quality and standards. If an educational institution can provide education with quality standards and low cost of education Inevitably shows that educational institutions are able to manage education to meet the needs of society.

The purposes of this research are to find the survival function, median survival time and hazard function of the termination of undergraduate students status (4-year program) of the Faculty of Science and Technology, Thammasat University, and to compare the survival time of termination of student status classified by curriculum, gender and domicile.

Research Methodology

Data Collection

The information of 624 undergraduate students in the Faculty of Science and Technology, Thammasat University (4-year program: Graduating in the academic year 2020) including curriculum, gender, domicile, average grades at the high school and average grades before the termination of student status were collected by the office of Registrar, Thammasat University.

Survival Analysis

Survival analysis is a statistical technique that studies the timing of a critical event of an event of interest. It is to track the occurrence of an event for a certain period of time to observe whether the event of interest will occur or not. The event of interest may be illness, recovery, death or unemployment (Hosmer, Lemeshow, and May, 1999), etc. The period until the event is called “Survival time”. The analysis therefore uses a percentage or the rate of occurrence of such events which often has incomplete data (censoring observation) due to many reasons, for example, the duration of the research is limited, causing some sample units to have events of interest after the end of the study; some units lost follow-up from the study for unknown reasons (Dancey, Reidy and Rowe, 2012).

In the survival analysis, there are two functions that are of interest to study, namely the survival function $(s(t))$ and the hazard function $(h(t))$.

1) The survival function: $s(t)$ is the basis of survival analysis, indicating the probability that an individual survives after time t. where each sample survives longer than the time point t or the likelihood of an event occurring after time t, as the equation.

$$s(t) = P[T > t]\,;\, t > 0$$

At $t = 0$, the value $s(t) = s(0) = 1$ because no one has yet occurred. In other words, the probability of survival. or probability of survival or probability of event-free at the beginning of the study is 1.

At $t = \infty, s(t) = s(\infty) = 0$ because no one survives. Everyone has an incident that is, the probability of survival. or that which has not yet occurred when the study period is infinite is equal to 0.

2) Hazard Function: $h(t)$ is the ratio between the probability of an event occurring at time t $(f(t))$ to the probability of survival at time t. That $(s(t))$, with survival until then or the likelihood of an event of interest occurring at time t without the event occurring until that time. It is a conditional probability.

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t < T \leq t + \Delta t \,|T > t)}{\Delta t}$$

t = beginning of time of interest in the study
T = end of study time
Δt = the absence of an event in the period $t - T$

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t < T \leq t + \Delta t)}{\Delta t} \times \frac{1}{S(t)} = \frac{f(t)}{S(t)}$$

$$h(t) = \frac{f(t)}{1 - F(t)}$$

Survival Analysis*: *Kaplan-Meier Estimate

It is a method of estimating the conditional probability of the time an event will occur. The Kaplan-Meier model is based on estimating the conditional probability at each time point at which the event occurs. It starts with the survival times being arranged in ascending order. At the beginning of the study at t = 0, the event of interest has not yet occurred, so the probability of the event of interest is equal to 1. The event of interest can be estimated as follows:

$$\hat{s}(t) = \prod_{t_i \leq t} \frac{n_i - d_i}{n_i}$$

$\hat{s}(t)$ = probability of occurrence of the event of interest at time t.
n_i = number of exposures to risk factors
d_i = number of events
i = sequence of events at any time t

Survival Analysis*: *The Log Rank Test

Log-rank test is a hypothesis test to compare the survival distributions of two samples. The log rank test is a popular test to test the null hypothesis of no difference in survival between two or more independent groups. The test compares the entire survival experience between groups and can be thought of as a test of whether the survival curves are identical (overlapping) or not.

The statistics used for testing are $\chi^2_{cal} = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \sim \chi^2_{\alpha,k-1}$

where k is the number of sample groups used for comparison.

For this research,

Survival time means the time when students start to study in the regular undergraduate program, 4-year program (Academic year 2017 to 2020), Faculty of Science and Technology, Thammasat University until the event of termination of student status.

Event means an event that occurs.
The value is 1 when it is an event of interest to study (termination of student status).
The value is 0 when it is a censored case.

Termination of student status means an event in which a student has to leave Thammasat University before graduation as specified by the curriculum for any of the following reasons : 1) Lack of qualifications or prohibited characteristics of being a university student 2) His name was withdrawn from the student register 3) The study period as specified by the regulations or the curriculum requirements has passed 4) Resign from being a student 5) Being subjected to severe disciplinary action to the extent of expulsion from student status 6) Died 7) Failure to register within the period specified by the university and did not request a leave of absence within 30 days from the opening date of that semester.

Censored case means the case where a student has completed a 4-year curriculum or has graduated but took more than 4 years to study.

Result

Semester	Number Entering Interval	Number Withdrawing During Interval	Number Exposed To Risk	Number of Terminal Events	Proportion Terminating	Proportion Surviving	Cumulative Proportion Surviving at End of Interval	Standard Error of Cumulative Proportion Surviving at End of Interval	Probability Density	Standard Error of Probability Density	Hazard Rate	Standard Error of Hazard Rate
0	624	21	613.5	0	0	1	1	0	0	0	0	0
1	603	0	603	29	0.05	0.95	0.95	0.01	0.048	0.009	0.05	0.01
2	574	0	574	97	0.17	0.83	0.79	0.02	0.161	0.015	0.18	0.02
3	477	0	477	27	0.06	0.94	0.75	0.02	0.045	0.008	0.06	0.01
4	450	0	450	13	0.03	0.97	0.72	0.02	0.022	0.006	0.03	0.01
5	437	0	437	4	0.01	0.99	0.72	0.02	0.007	0.003	0.01	0
6	433	0	433	3	0.01	0.99	0.71	0.02	0.005	0.003	0.01	0
7	430	0	430	7	0.02	0.98	0.7	0.02	0.012	0.004	0.02	0.01
8	423	1	422.5	2	0	1	0.7	0.02	0.003	0.002	0	0
9	420	0	420	1	0	1	0.7	0.02	0.002	0.002	0	0
10	419	2	418	0	0	1	0.7	0.02	0	0	0	0
11	417	0	417	1	0	1	0.69	0.02	0.002	0.002	0	0
12	416	416	208	0	0	1	0.69	0.02	0	0	0	0
The median survival time was not determined.												

Table 1: Life table of Science and Technology undergraduate students

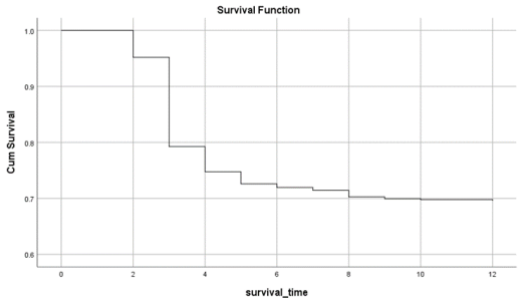

Figure 1: Survival function of Science and Technology undergraduate students

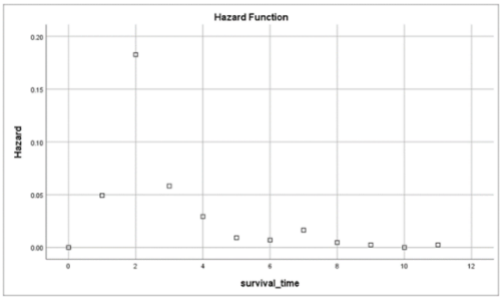

Figure 2: Hazard function of Science and Technology undergraduate students

From Table 1 and Figures 1-2, the Kaplan-Meier estimator is used to estimate the survival function. It was found that the undergraduate students of the Faculty of Science and Technology had the highest risk of termination of student status equal to 0.18 in the second semester of the 1st Year, and there was a chance that students would remain as students longer than the second semester of the 1st Year equal to 79%. It was also found that the median survival time could not be determined because there were no cases where half of the students lost their status during the study period.

Log-rank Test	Chi-Square	df.	P-value
Curriculum	29.769	13	0.005
Gender	0.731	1	0.393
Domicile	4.504	1	0.034

Table 2: Log Rank Test classified by curriculum, gender and domicile

From Table 2, it was found that there were significantly different survival times of termination of student status between students for each curriculum and domicile (P-value = 0.005 and 0.034, respectively). Male and female students had no difference in survival time of termination of student status (P-value = 0.393).

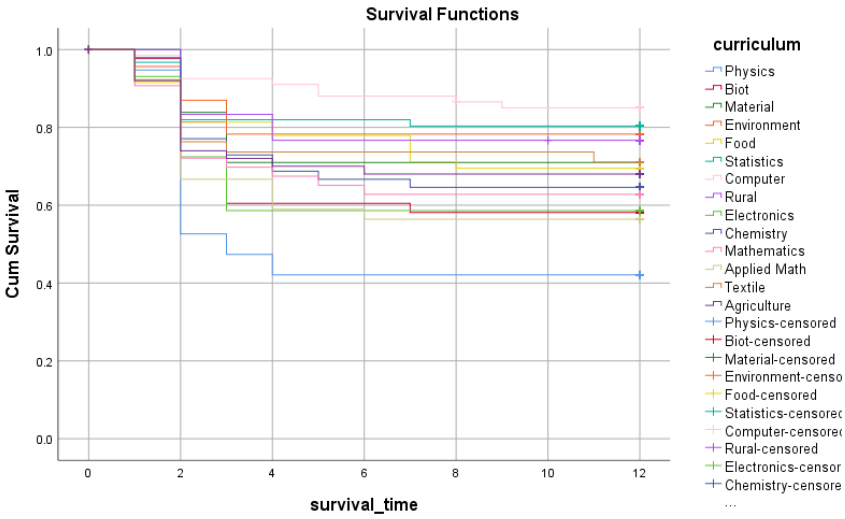

Figure 3: Survival function of Science and Technology undergraduate students classified by curriculum

From Figure 3, it was found that the top 3 curriculum with the highest cumulative proportion of students survival at the end of time were Computer science, Statistics and Environmental science. The last three subjects with the lowest cumulative proportion of student survival at the end of time were Biotechnology, Applied Mathematics and Physics.

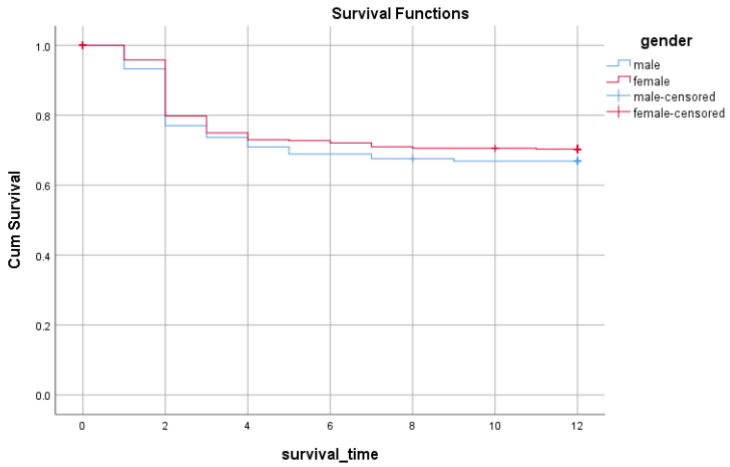

Figure 4: Survival function of Science and Technology undergraduate students classified by gender

From Figure 4, it was found that male and female students had no difference in survival time of termination of student status.

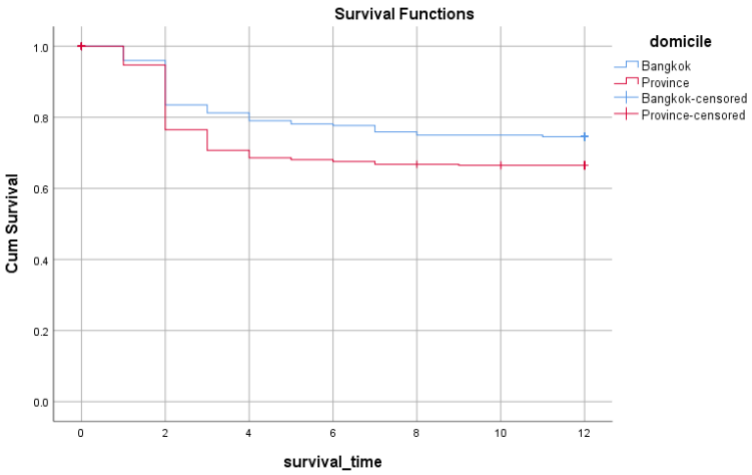

Figure 5: Survival Function of Science and Technology undergraduate students classified by domicile

From Figure 5, it was found that students residing in Bangkok had the cumulative proportion of survival higher than students who domiciled in other provinces.

Conclusion and Discussion

The undergraduate students of the Faculty of Science and Technology had the highest risk of termination of student status in the second semester of the 1st Year. Students majoring in Physics, Materials Science, Food Science and Technology, Statistics, Computer Science, technology for sustainable development, Physics Electronic, Chemistry, Mathematics, Applied Mathematics, Textile Science and Technology and agricultural technology have the highest rate of danger of losing student status in the second semester of the 1st Year, biotechnology and environmental science students have the highest rate of danger of losing student status in the third semester of the 1st Year. Furthermore, curriculums and domiciles influence the termination of student status.

From the analysis results, it was found that students have the highest risk of losing student status in the second semester of the first academic year, which may be caused by students dropping out to take entrance examinations at other universities or other faculties that are more interested in or take the entrance examination to become a new student again in the same field of study due to academic performance below the criteria. There are many students who do not have a goal of what field they want to study or what is the motivation for studying. Some students have no purpose in learning. Finally, when boredom occurs, they use the method of changing their field of study or changing universities. In order to resolve such problems, the faculty may offer career guidance related to that field of study for students to aim in their studies. In addition, there should be activities to adjust the basic knowledge of the basic subjects of that field for first-year students for students to have better academic results. It is also a way to reduce the problem of losing student status of students as well.

References

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