The Effect of Budget Received from the Government on Rank Received by Asia Times Higher Education: A Case Study of Thai Universities

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Abstract

This research article is for study purposes a positive relationship with raking received the two research questions required two different statistical tests. No study has tested the relationship between budget received and rank received, treating the second variable as ordinal, yet. Thus, there is a knowledge gap that needs to be filled. To investigate the relationship between (university) budget received and (ordinal) rank received by Asia Times Higher Education (THE). The context of this study included major Thai universities that participated in Asia. The data collection method was document review to capture the required data for analyses of the study. The data analyses included both descriptive and inferential statistics. The budget received was not correlated with (ordinal) rank received. While budget is still very important factor affecting ranking confirmed by previous research, universities that received less budget could still have chances of moving up the ranking ladder, as confirmed by the result of this study. In summary, this research offer a number of contributions. In term of knowledge, it extended beyond the work of Kumar et al. by offering and examining new research questions. In term of theory, it proposed a (new) conceptual framework to examine the phenomenon of interest at hand. In term of methodology, it used a more advanced (inferential) statistic, OLR, to test the hypothesis of the study, in comparison with the work of Kumar et al. In term of practice, this will be discussed below. Based on the findings of the study, the results confirmed that budget received (ratio data) did not have a significant effect on rank received (ordinal data). This is, in fact, a desirable result. The result of the study has a clear implication for practice. Given that result, it implies that universities with less funding still have chances on moving up the ranking ladder. In other words, they do not have to wait for bigger budget to achieve higher ranking. In addition, it is also encouraged that universities interested in obtaining a rank position pursue the inexpensive routes.

Keywords: Budget, Ranking, Thai Public Universities, Asia Times Higher Education

Introduction

There are claims that budgets that universities received from their governments has much to do with the ranking received by ranking institutions. One such claim was published in the ABS-CBN News (2012). Given those claims, the budget could be viewed as a genuine factor that leads

to obtaining a university ranking. The work of Kumar et al. (2021) proves such a claim. They found that budgets for capital and library expenditures (not the whole budget per se) were correlated with university ranking (received) at universities in India. However, Kumar's study focused only used correlation analysis (using Pearson correlation coefficient (r)), because both variables were continuous data. They could not go beyond correlation analysis, given the data they had on hand. Thus, it could be viewed that this study builds on the work of Kumar et al., by examining the effect of budget received on ranking received (using ordinal logistic regression), using Thai universities to illustrate the point. In short, this work is different and beyond the work of Kumar et al.

Given the work of Kumar et al., there are research gaps that this research study has identified, namely, knowledge, theoretical, and methodological gaps. In term of identifying research gaps, this research study draws upon work of Miles (2017) to serve as bases for identifying research gaps for this study. Let's now start with the first research gap of the study, knowledge gap. Miles (2017, cited Jacobs 2011; Müller-Bloch & Kranz 2014; Miles 2017) defines knowledge gap as the desired research findings do not exist. Indeed, desirable research results for the phenomenon of interest at hand, not yet, exist. Let's move on to theoretical gap. Miles (2017, cited Müller-Bloch & Kranz 2014; Jacobs 2011; & Miles 2017) defines theoretical gap as, theory should be applied to certain research issues to generate new insights. For this research, there is no theory exists that could be use as a frame of reference for data collection and analysis; thus, this could be considered a theoretical gap. Thus, one needs to be developed. Let's move on to the last gap, methodological gap. Miles (2017, cited Jacobs 2011; Müller-Bloch & Kranz 2014; & Miles 2017) defines methodological gap as, a variation of research methods is necessary to generate new insights or to avoid distorted findings. The work of Kumar et al. only used Pearson's r. But, this research study used ordinal logistic regression to test the proposed theory of the study (hypothesized conceptual framework). In summary, this paper fills all the research gaps identified in this section. All contributions, based on fillings the research gaps of the study, will be discussed later in the discussion section.

Research objectives

The study has tested the relationship between budget received and rank received, treating the second variable as ordinal, yet. Thus, there is a knowledge gap that needs to be filled.

Literature review

This section focuses on four major sections. The first section provides an overview of universities in Thailand. The second section describes the ranking criteria of Asia Times Higher Education. The third section captures variables of the study. Finally, the conceptual framework of the study is presented, along with the hypothesis of the study.

Universities in Thailand

In Thailand, there are twenty-two autonomous universities. There are nine public universities. The first two categories could be qualified as major universities in Thailand. In addition, there are thirty-eight Rajabhat Universities. These are regional universities and focus mainly on local community development and engagement. There are nine Rajamangala Universities of Technology (RMUT). RMUTs have a strong focus on technology and technical fields as they were established as polytechnic colleges before being granted university status in 2005. Finally, there are forty-two private universities. Thai universities that participated in the Asia THE are in the first two categories: autonomous and public universities.

Asia Times Higher Education's ranking criteria

THE is one of the major university ranking institutions of the world **(**College and University Rankings, n.d.), in the business of university ranking since 2004 (Times Higher Education World University Rankings n.d.). To be ranked, prospective universities must apply and pay fees. Then, the participated universities are ranked according to the predetermined ranking methodology. Ludden et al. (2021) specifically describe the ranking methodology of Asia THE. They state that the performance indicators are grouped into five areas: teaching (the learning environment); research (volume, income, and reputation); citations (research influence); international outlook (staff, students, and research); and industry income (knowledge transfer). Detailed information on the five areas used in university ranking could be found at the Asia THE's website(https://www.timeshighereducation.com/world-university-rankings/asia-university rankings-2021-methodology). In short, if universities in Asia want to achieve higher rankings, they must do well on the five areas mentioned here.

Variables of the study

As mentioned in the introduction section that a conceptual framework applicable to the phenomenon of interest at hand does not exist. Thus, a (new) conceptual framework needs to be developed. As a consequence, critical variables must be identified to serve as building blocks to develop a conceptual model of the study. This research is designed to test the effect of budget received on rank received. Given that, two critical variables of the study were identified: budget received and rank received. Fortunately, the two variables exist in existing literatures. The two variables were used to serve as building blocks to develop the conceptual framework of the study. Then, hypothesis of the study is immediately proposed following the new development of the conceptual framework of the study

Budget received

In the context of this study, budge (money) received basically refers to annual budget that Thai government universities receive from the Thai government. The budget information is available to the public. According to Lao (2019), the Thai government budget for the university

sector is divided into four main categories which covers government agencies, public organisations, state enterprises, and a research fund. In short, budget received is treated as an independent variable of the study. By the way, in term of statistics, budget received is a continuous (ratio) variable.

Rank received

In the context of this study, rank received basically means that ranks received from the ranking institution (i.e. Asia THE). Rankings are made available to the public on annual basis. The Times Higher Education Asia University Rankings 2021 uses the same 13 performance indicators as the THE World University Rankings, but they are recalibrated to reflect the attributes of Asia's institutions. The universities are judged across all their core missions – teaching, research, knowledge transfer and international outlook – to provide the most comprehensive and balanced comparisons available (Times Higher Education 2021). In short, rank received is treated as dependent variable of the study. By the way, in term of statistics, rank received is categorical (ordinal) variable.

Conceptual framework

The conceptual framework of the study is constructed based on variables identified in previous sections. Given the phenomenon of interest at hand, there is no (exiting) model proposed to examine the phenomenon of interest. Thus, a new conceptual framework is, indeed, needed. Figure 1 captures the conceptual framework of the study. Budget receive is treated as independent variable (IV). Here, IV is a continuous variable. On the other hand, rank received is treated as dependent variable (DV). Here, DV is an ordinal variable. The relationship between rank received (from the Asia Times Higher Education), and budget received (from the Thai government) in captured in Figure 1. The conceptual model of the study followed the concept of parsimony. According to Allen (2017), the application of parsimony or Ockham's (or Occam's) razor is critically important to theory development as it advocates for simplicity over complexity and necessity over the superfluous to explain a given phenomenon.

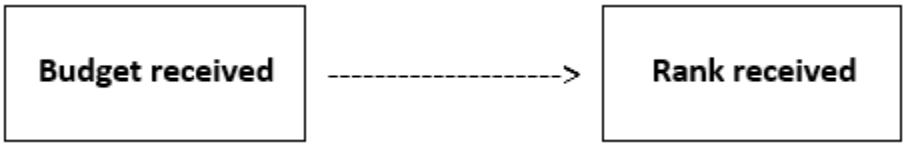

Figure 1: Conceptual framework, the hypothesized relationship, rank received and budget received

Hypothesis of the study

The hypothesis of the study is developed based upon the conceptual framework of the study above, as follow:
H1: Budget received has a significant positive effect on (ordinal) rank received.

Methodology

Sampling method

The target population includes universities participated in Asia Times Higher Education. However, this research only targets Thai universities participated in Asia THE, because these Thai universities are operating under the same set of rules and regulations of the Thai government. There are seventeen Thai universities participated in the Asia THE (see Table 1). Thus, purposive sampling method is employed.

Data collection method

Document review is used as the data collection method. It is a method used to collect existing documents (U.S. Department of Health and Human Services 2018). Broadly speaking, documents are classified into two types: print and digital. The latter includes documents publicly available on the internet, such as, documents on Thai university budgets and university rankings that Thai universities received by Asia THE. The use of existing (secondary) data to test new hypotheses or answer new research questions has several advantages (Dunn et al. 2015).

Data analysis method

The main hypothesis of this research is budget received (from the Thai government) has a significant positive effect on rank received (ranked by Asia THE). To test the study's main hypothesis, ordinal logistic regress (OLR), because the dependent variable (rank received) of the study is a categorical (ordinal) variable. On the other hand, the independent variable (budget received) of this study is a continuous (ratio) variable. Thus, the data types of both IV and DV fit the requirements of OLR. The data analysis of the study begins with identifying a required dataset, followed by a Box-and-Whisker Plot (budget received sorted by rank received), Scatterplot (budget received and rank received), Spearman's rank correlation (testing the correlation between budget received and rank received), finally Ordinal logistic regression (OLR, testing the effect of budget received and rank received). By the way, all analyses were conducted by jamovi, free and open statistical software (The jamovi project 2021).

Results

This section summarizes the results of the analyses of the study in order already described in previous section. First, it began by describing the dataset of the study. Second, classification of budget received sorted by rank received was conducted using Box-and-Whisker Plot. Third, scatterplot was carried out to illustrate the association between budget received and rank received. Forth, Spearman's rank correlation analysis was conducted to test the correlation between budget

received and rank received. Finally, OLR was conducted to test the effect of budget received on rank received.

Data preparation and datasets of the study

The research data need to be prepared for further analyses. Data preparation refers to the process of collecting, cleaning, and consolidating data into one file or data table, primarily for use in analysis (ATLAIR n.d.). The data preparation of this study follows that definition. As mentioned, document review is used as the main research instrument of the study. There are two major (internet) sources of research data. First, the budget information was obtained from the website of Thansettakij (2020, June 30). Second, ranking information was obtained from the Asia THE's website (https://www.timeshighereducation.com). Both of these pieces of informations are also available on other websites.

Table 1 serves as a reference table for Table 2. Columns 2 and 4 of Table 1 become Columns 3 and 6 of Table 2. It is necessary to establish Table 1, because Columns 1 and 3 only provide ranks in (ordinal) intervals (see Table 1). These interval ranks could not be used as input for further statistical analysis using OLR. Thus, Columns 2 and 4 of Table 1 need to be created. Again, The Asia THE does not provide Columns 2 and 4. Thus, the researcher arbitrarily established Columns 2 and 4 in Table 1 to serve as Columns 3 and 6 in Table 2 as proxies to be used in conducting OLR later. Please be informed that OLR is the main analysis of the study.

Table 1: Conversion of Asia THE's ordinal ranks in intervals to ordinal ranks in integers

(1) Asia THE Rank (2021)	(2) Rank (Ordinal data)	(3) Asia THE Rank (2022)	(4) Rank (Ordinal data)
0 - 50	1	1-200	1
51 - 100	2	201-400	2
101 - 150	3	401-600	3
151 -200	4	601-800	4
201 - 250	5	801-1000	5
251 - 300	6	1001-1200	6
301 - 350	7	1200+++	7
351 - 400	8	-	-
400 +++	9	-	-

Table 2 below describes the dataset of the study. The dataset includes all the names of Thai universities participated in the Asia THE university ranking. Columns 1 and 4 presents rankings for years 2022 and 2021 respectively. Columns 2 and 5 turn all numbers under Columns 1 and 4 into concrete ordered ranks (integers, e.g. 4, 3, 4). The purpose is to make it possible for all those numbers from Columns 1 and 4 to be analyzable. Columns 3 and 6 include the actual amounts of budget received from the Thai government for each university participated in Asia THE ranking

for years 2021 and 2020 respectively. Again, all research data are secondary. Given the nature of the study, secondary data are essential, because these data come from their as original sources: the government for budget received information and the Asia THE for rank received information.

Table 2: Datasets of the study

Names of universities	Budget and ranking 2020-2021			Budget and ranking 2021-2022		
	(1) Budget 2020	(2) Rank 2021	(3) Rank (ordinal)	(4) Budget 2021	(5) Rank 2022	(6) Rank (ordinal)
1. Mae Fah Lung University	2,068.8	187	4	1,935.2	601-800	4
2. Mahidol University	12,023.4	130	3	13,146.5	601-800	4
3. Chulalongkorn University	5,059.3	194	4	5,193.5	801-1000	5
4. KMUTT (Thonburi)	2,091.1	201-250	5	2,119.9	801-1000	5
5. Chiangmai Univrsity	5,525.3	251-300	6	5,501.1	1001-1200	6
6. Burapha University	1,797.6	401+	9	1,862.8	1201+	7
7. Kasetsart University	4,919.9	401+	9	5,139	1201+	7
8. Khonkaen University	5,119.6	401+	9	5,383.3	1201+	7
9. KMUTT (Ladkrabang)	2,174.3	351-400	8	2,081.4	1201+	7
10. KMUTT (North Bangkok)	2,091.1	351-400	8	2,119.9	1201+	7
11. Mahasarakham University	1,033.9	401+	9	1,095.6	1201+	7
12. Silpakorn University	1,904.7	401+	9	1,678	1201+	7
13. Naresuan University	2,296.9	401+	9	2,358.3	1201+	7
14. Prince of Song Kla University	5,607.2	401+	9	5,607.2	1201+	7
15. Srinakharinwirot University	3,816.5	401+	9	3,879.6	1201+	7
16. Suranaree University of Technology	1,731.2	401+	9	2,099.8	1201+	7
17. Thammasat University	4,463.4	351-400	8	4,845.9	1201+	7

Box-and-Whisker Plot

The purpose of this analysis to visually examine the association between budget received and rank received. According to Krzywinski & Altman (2014), visualization methods enhance our understanding of sample data and help us make comparisons across samples (ranking years 2021-2022). Based on Figure 2 below, the Box-and-Whisker Plot illustrates the amount of budget received (by Thai universities from the Thai government) sorted by rank received (from Asia THE) for ranking years 2021 and 2022, because two datasets were used to test the research hypothesis of the study. Visually, it appears that budget received is related to rank received for the sub-figures.

However, visual perceptions are not adequate to conclude that our main hypothesis of the study is true, or the other way around (untrue). Thus, we need to take our analysis further. Next, we used scatterplot to examine the same variables: budget received and rank received.

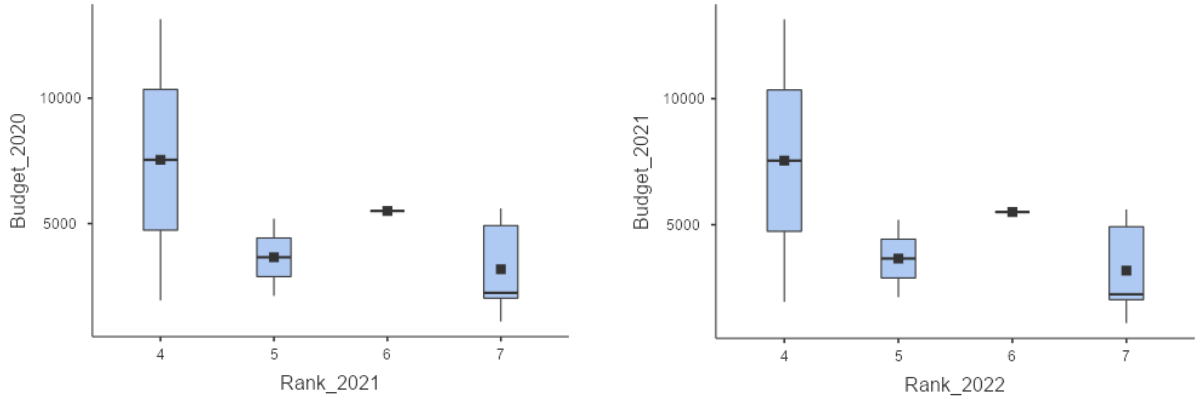

Figure 2: Budget received sorted by rank received

Scatterplot

The purpose of this analysis is to examining the association between budget received and rank received using scatterplot. According to Rensink (2016), scatter plot could help us visually understand the nature of association between variables at the descriptive level. Friendly & Denis (2005) elaborates that scatterplot is a diagram having two variables plotted along its two axes and in which points are placed to show the values of these variables for each of a number of subjects, so that the form of the association between the variables can be seen. In the context of this study, scatterplot is carried out to illustrate the relationship between budget received and rank received in visual representation. Based on Figure 3 below, it appears that budget received is not associated with rank received, illustrated by scatterplots. To be more certain, correlation analysis between the two variables is required. Correlation analysis is carried out in the next section.

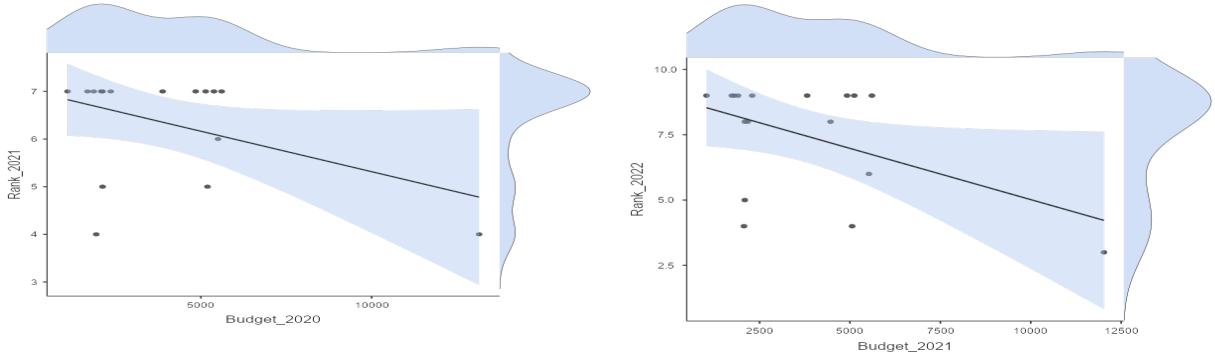

Figure 3: The results of Scatterplot

Correlation analysis

In the context of this study, Spearman's rank correlation (non-parametric test) to carry out the correlation analysis, because rank received is categorical (ordinal) data (Singhal & Rana 2015) and budget received is continuous (ratio) data. This type of correlation analysis is also called a Test of Independence (between two (target) variables). Based on the tables both left and right below, the p-values are greater than 0.05 (p>0.05). The analysis of the study could stop here. To be absolutely certain, OLR is carried out in the next section below.

Table 3: Correlation matrices

Correlation Matrix

Correlation Matrix

		Budget_2020	Rank_2021
Budget_2020	Spearman's rho	—	
	p-value	—	
Rank_2021	Spearman's rho	−0.300	—
	p-value	0.242	—

Note. * p < .05, ** p < .01, *** p < .001

Correlation Matrix

Correlation Matrix

		Budget_2021	Rank_2022
Budget_2021	Spearman's rho	—	
	p-value	—	
Rank_2022	Spearman's rho	−0.271	—
	p-value	0.292	—

Note. * p < .05, ** p < .01, *** p < .001

Ordinal logistic regression analysis

In the context of this study, OLR is employed to test the effect of budget received on rank received. It has be reminded that OLR is a type of regression that dependent variable is categorical (ordinal) (Singh et al. 2020). Table 4 presents the results of OLR. The results revealed that budget received did not have a significant effect on rank received (p>0.05), based on Table 4, as expected because the correlation analyses were not significant. This has major implications on practice, which will be discussed in the discussion section below.

Table 4: The results of ordinal logistic regress analyses

Ordinal Logistic Regression

Model Fit Measures

Model	Deviance	AIC	R^2_{McF}
1	42.9	54.9	0.0954

Note. The dependent variable 'Rank_2021' has the following order: 3 | 4 | 5 | 6 | 8 | 9

Model Coefficients - Rank_2021

Predictor	Estimate	SE	Z	p
Budget_2020	−4.59e−4	3.23e−4	−1.42	0.155

Ordinal Logistic Regression

Model Fit Measures

Model	Deviance	AIC	R^2_{McF}
1	27.5	35.5	0.117

Note. The dependent variable 'Rank_2022' has the following order: 4 | 5 | 6 | 7

Model Coefficients - Rank_2022

Predictor	Estimate	SE	Z	p
Budget_2021	−3.83e−4	2.52e−4	−1.52	0.129

Discussion

The research hypothesis of the study is that budget received (IV) has a significant effect on rank received (DV). The two findings (see Table 4) from the two datasets (see Table 2), however, rejected the research hypotheses ($p>0.05$). The first finding on the left side above (see Table 4, based on the first dataset 2020-2021, Table 2) did not support the hypothesis of the study. The second finding on the right side above (see Table 4, based on the second dataset 2021-2022, Table 2) also did not support the hypothesis of the study ($p > 0.05$). Why did we use two datasets (not one)? It is a good idea to use two datasets, rather than one. The assumption is that any given robust conceptual framework (model) should be able to stand against any number of datasets, not just one, and still achieving the desired model fits. According to Kenton (2020), a model is considered to be robust if its outputs and forecasts are consistently accurate even if one or more of the input variables or assumptions are drastically changed due to unforeseen circumstances.

In summary, this paper offers both knowledge and practical contributions. For knowledge contribution, this research offers a new conceptual framework (lens) to examine the phenomenon of interest at hand. This could be considered as a theoretical contribution. In addition, this research employed OLR, not just Pearson r study unlike the work of Kumar et al. This could be considered a methodological contribution. For practical contribution, the notion that budget received has a strong influence on ranking received has to be reconsidered in practice, because it is leaning towards less realistic based upon empirical findings of this study. Based on the OLR analysis, the effect of budget received on rank received was rejected. This has major implication on universities receiving less funding from the government still have chances on moving the ranking ladder.

Conclusion

In summary, this research offer a number of contributions. In term of knowledge, it extended beyond the work of Kumar et al. by offering and examining new research question. In term of theory, it proposed a (new) conceptual framework to examine the phenomenon of interest at hand. In term of methodology, it used a more advanced (inferential) statistic, OLR, to test the hypothesis of the study, in comparison with the work of Kumar et al. In term of practice, this will be discussed below. Based on the findings of the study, the results confirmed that budget received (ratio data) did not have a significant effect on rank received (ordinal data). This is, in fact, a desirable result. The result of the study has a clear implication for practice. Given that result, it implies that universities with less funding still have chances on moving up the ranking ladder. In other words, they do not have to wait for bigger budget to achieve higher ranking. In addition, it is also encouraged that universities interested in obtaining a rank position pursue the inexpensive routes, as suggested by the work of Bothwell et al. (2016), namely, “Top 20 Ways to Improve Your World University Ranking.” For further research, as suggested earlier, similar studies should be conducted on universities participated in Asia THE. The study is not without limitation. This study only focuses on Thai universities participated in Asia THE. However, the entire population in the context of this research extend beyond Thai universities. Thus, this could be viewed as one of the limitations. To proof internal validity, other group(s) of universities should be studied, for

example, groups of universities from Singapore and China. By the way, according to Patino & Ferreira (2018), internal validity is defined as the extent to which the observed results represent the truth in the population we are studying.

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