Analysis of the role of universities in supporting sustainable growth: The case in Indonesia

R K Sari\textsuperscript{1*}, C Hidayat\textsuperscript{2} and S Bangapadang\textsuperscript{1}

\textsuperscript{1,3}Management Department, BINUS Online Learning, Bina Nusantara University, Jakarta, Indonesia 11480
\textsuperscript{2}Management Department, BINUS Business School Undergraduate Program, Bina Nusantara University, Jakarta, Indonesia 11480

E-mail: rini@binus.ac.id

Abstract. Indonesia is predicted to experience a demographic bonus period in 2030. For Indonesia to get the maximum benefit from this demographic bonus, the availability of abundant productive-age human resources must be balanced by improving the quality of education and skills. Educated and competitive human resources need to be developed in terms of the number and quality of competitiveness in supporting sustainable growth. In this research, the authors want to see the role of universities in influencing economic growth. The role of universities can be measured by the number of universities, college enrolment rate, and the Human Development Index (HDI). The analysis used in this study is the multiple linear regression analysis. The research data used are panel data from 34 provinces in Indonesia with the studied year of 2015 - 2018. The result shows that the role of universities in Indonesia is not yet optimal in supporting Indonesia's economic growth in terms of the number of universities and college enrolment rate.

Keywords: economic growth, universities, college enrollment rate, HDI

1. Introduction
Indonesia will face a demographic bonus in 2030. The population of Indonesia is predicted to be 305,652,000 million. Thus, human resources must be optimized. Indonesia is highly expected to have one of the objectives in line with Sustainable Development Goals (SGD) about sustainable economic growth, higher levels of productivity, and technological innovation. Increased productivity levels can be achieved due to full and productive employment and decent work for all women and men by 2030.

The availability of abundant human resources at a productive age must be balanced with an increase in quality in terms of education and skills. All countries view universities to have a very important role in producing human and labor resources that can advance economic interests in a highly competitive environment in the global market [1].

Based on several studies, the higher someone's education level is, the better job they will get. Similarly, all countries are interested in raising the average level of schools in their population. By increasing the average level of education, it is expected to increase productivity, improve the quality of work in the economy, and increase economic growth. Higher education plays an essential role in determining the competitiveness of a country or region [2, 3, 4].

The university has a contribution to the economy in terms of providing a competent workforce. Universities are expected to transfer knowledge and technology through seminars, research publications, or reports to policymakers [5, 6, 7].

Increasing employment and focusing on economic structuring are key tools for improving the level and quality of education. However, in Indonesia, higher education is not free but expensive investment.
Without significant education reforms, Indonesia cannot expect positive change because significant social and economic structuralizing is needed [8].

The growth rate of the labor force has a positive and significant effect on economic growth, so it needs to improve the quality of the workforce. It is important to prepare a quality workforce that is superior, skilled, and reliable. It must be balanced with the quantity of the Indonesian population [9].

Education is currently considered important as an investment in human resources used in sustainable economic growth [10]. Thus, the government must increase education investment and improve service efficiency to develop more talent [11].

In this study, the authors want to see the role of universities in influencing economic growth. The role of universities can be measured by the number of universities, the college enrollment rate, and the Human Development Index (HDI). Many factors affect economic growth. The time limitation of making research must focus on the influence of the number of universities, college enrollment rate, and HDI in Indonesia.

2. Literature review

The economic growth model in the basic production function discusses human resources as additional inputs in the aggregate production function, where macroeconomic output is a direct function of input factors: physical capital, labor, and human capital that drives technical progress or productivity [12].

The new economic growth model optimizes the potential of human resources with the power of science, natural resources, technological assets, and institutions. This theory of economic growth is known as the endogenous growth theory. Endogenous growth theory states that education will create innovation and knowledge about developing new ideas and technologies in producing products. Thereby, it contributes to economic growth [13].

According to human capital theory, higher education will affect one's present and future well-being [14]. Investing in human capital affects future real income. Human capital investment can be in the form of education. Higher education will increase one's ability so that it will increase productivity. Because productivity increases, income will also increase.

2.1. Effect of the number of universities on economic growth

Research, conducted using 1950-2010 data on 15,000 universities in around 1,500 regions in 78 countries and a fixed-effect model, found that increasing the number of universities had a positive influence on future Gross Domestic Product (GDP) per capita growth. The 10% increase in the number of universities per capita in a region was associated with 0.4% GDP growth per capita in the future. The research also showed that the relationship between GDP per capita and the number of universities was not only driven by the direct expenditure of universities, staff, and students. A part of the influence of universities on growth is mediated through an increased supply of human capital and greater innovation [7].

Educational investment plays an important role in influencing economic growth. An increase in education investment of 1% will affect the increase in gross GDP by an average of 0.14% [11].

2.2. The effect of college enrollment rate on economic growth

The college enrollment rate can demonstrate the quality of government services to the rights of the community to gain access to tertiary education. The college enrollment rate also shows that the community has easy access to higher education [15]. The college enrollment rate shows the participation of people currently studying according to their level of education. The college enrollment rate measures the proportion between the population in the age group of higher education who are still studying and the population of the age group of 19-24 years. Calculating the college enrollment rate for each province shows the percentage of students who are residents in the province where they are studying.

A person's level of education affects the level of productivity of goods and services. Someone with a high school education will have different levels of productivity compared to someone with a bachelor's education. A high level of education will produce a high level of productivity.
There is a positive relationship between human capital and economic growth, which will be seen from the level of registration at various school levels for human resources and the GDP for sustainable economic growth [16].

2.3. Effect of HDI on economic growth
HDI is a measurement of life expectancy, education, and standard of living for all countries throughout the world. The high HDI illustrates that the province has good quality human resources. The faster human development by equalizing education and health is, economic growth will increase productivity and employment opportunities. So, HDI contributes positively to economic growth [17].

Economic growth is the main driver in increasing HDI, and vice versa. HDI is one of the important factors in creating quality economic growth [18].

3. Research method
Sources of data in this study came from the Ministry of Education and Culture and the Statistics Indonesia in 2015-2018. The relationship between the independent variable and the dependent variable is in Figure 1.

![Figure 1. The Relationship Between the Independent Variable and The Dependent Variable.](image)

The object of research is 34 provinces in Indonesia and the study period in 2015-2018. Thus, it produces a total of 135 panel data. Panel data analysis (data set) is an analysis tool that combines cross-sections and time series. The operational definitions of research variables are explained in Table 1.

| Variable | Conceptual Definition | Units of measurement |
|----------|-----------------------|----------------------|
| Economic growth (Y) | The percentage of real gross regional domestic product (GRDP) compared to the current year against the previous year. | Percent |
| Number of universities (X_1) | The number of universities registered at the Ministry of Education and Culture. | Unit |
| College enrollment rate (X_2) | Percentage of the number of people studying at university to the total population aged 19-24 years old. | Percent |
| HDI (X_3) | An index that measures how people can access the results of development in obtaining income, health, and education. | Point |

4. Result and discussion
4.1. Regression test analysis
In this study using multiple regression with panel data, the first step taken is to do a chow test. Chow test is used to determine whether the model is between a common effect or a fixed effect. H_0 is rejected if the value of probability F is smaller than Alpha, which is smaller than 0.05. H_0 is the common effect model, and H_1 is the fixed effect model. The results can be seen in Table 2.
Table 2. Chow Test Result.

| Effect Test                | Statistics | d.f.   | Prob. |
|----------------------------|------------|--------|-------|
| Cross-section F            | 1.669010   | (33,98)| 0.0281|
| Cross-section Chi-square   | 60.206713  | 33     | 0.0026|

Hypothesis:
H₀: Common Effect
H₁: Fixed Effect

The redundant fixed effect or likelihood ratio result for this model has a probability value of F of 0.0000. It is smaller than alpha 0.05, so H₀ is rejected, and H₁ is accepted. The corresponding model of this result is fixed effect.

The Hausman test is used to choose between a fixed effect or random effect. A better fixed effect model is indicated by the significance value < 0.05 on the chi-square probability value. The results are in Table 3.

Table 3. Hausman Test Result: Fixed and Random Effects.

| Test Summary     | Chi-sq. Statistics | Chi-sq. d.f. | Prob. |
|------------------|--------------------|--------------|-------|
| Cross-section random | 3.641083         | 3            | 0.3029|

Hypothesis:
H₀: The model follows the random effect
H₁: The model follows the fixed effect

Based on the results of the Hausman test showed a significance value of 0.3029 (significance > 0.05). Then, H₀ is rejected, and H₁ is accepted. It can be interpreted that the random effect model is better than the fixed effect model. Next, the random effect model results are to see the results of the regression analysis (T-test, F-test, and coefficient of determination). Table 4 shows the results.

Table 4. Regression Result.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C        | 15.29745    | 4.475753   | 3.417850    | 0.0008|
| X₁       | 0.001955    | 0.002991   | 0.653527    | 0.5146|
| X₂       | 0.034566    | 0.026192   | 1.319727    | 0.1892|
| X₃       | -0.160690   | 0.069142   | -2.324063   | 0.0217|

\[ Y = -0.160690X₃ + e \] (1)

The number of universities does not affect economic growth. The regression results show that the regression value is 0.001955. The college enrollment rate does not affect economic growth. The regression results show that the regression value is 0.034566. Both probability values are above 0.05.

Education and investment in physical capital on economic growth in Greece prove that education has no significant relationship with economic growth [19]. There is no statistical relationship between college graduates and economic growth in the 15 countries studied between 1980-2000 [20]. A meta-analysis approach is to review empirical research on the relationship between educational development and economic growth. This study does not find an impact of representative educational growth, because different educational steps lead to various coefficients of the size of the effect of education on economic growth [10].

HDI has a negative relationship with economic growth. The regression results show that the regression value is -0.160690. If there is a 1% increase in HDI in Indonesia, it will affect the rate of economic growth, which will decrease by 0.160690%, assuming the other independent variables remain the same. HDI causes a negative effect on the rate of economic growth. In improving HDI, it includes
three things, namely longevity and healthy living, knowledge and decent living standards, and money. Economically, the community and government focus more on increasing HDI rather than economic growth. In line with the results of this study, public spending on education and health has a negative impact on economic growth [21]. Research conducted in 49 countries in Africa, finds that negative effects arise from inefficiency, corruption, bureaucracy, and lack of investment in the health and education sectors. Another research results show that moderation between the HDI through special autonomy funds has a significant negative effect on economic growth [22]. It happens because the use of special autonomy funds for the HDI continues to rise, but its use is not allocated according to needs in 23 districts/cities in North Sumatra province. So, there is no increase in HDI, even though economic growth increases.

4.2. The success of the provinces in Indonesia in providing the number of universities in accordance with their needs

The number of universities in each province illustrates the ability of a province to provide universities. The availability of universities in a province must be balanced with the college enrollment rate. It is not good if there are many universities, while the college enrollment rate is low. It will lead to a lack of the role of universities in educating the community to the fullest due to the lack of students. Conversely, if the number of universities is small, but the college enrollment rate is high, the role of universities in teaching is not optimal. It is due to the imbalance between facilities and infrastructure in teaching activities. For example, the universities will experience a shortage of teaching staff and learning classes.

In Indonesia (see Figure 2), several provinces experience inequality or a large gap between the number of universities and college enrollment rate. The biggest gap is West Java province. West Java province has 394 universities, but the percentage of the number of people studying in universities to the total population of college-age (college enrollment rate) is very low at 25.14%. It means that there are only a few indigenous people of West Java who have received tertiary education, assuming they prefer to work rather than study. Students who study in West Java are students from outside West Java.

The gap between the number of universities and the college enrollment rate with the smallest inequality level is provinces of West Papua, Maluku, and D.I. Yogyakarta. It shows the balance carried out by the provinces in the provision of universities in facing the college enrollment rate.

![Figure 2. Comparison between the Number of Universities and College Enrollment Rate in 2018 Based on Provinces in Indonesia.](Source: Statistics Indonesia)
The college enrollment rate is used to measure the success of educational development programs that are held to expand opportunities for residents to receive tertiary education. The college enrollment rate is an indicator to measure the absorption capacity of the school-age population (19-24 years old) in universities. The college enrollment rate means that more school-age children attend high school, and the ideal score is 100%. The highest college enrollment rate came from D.I. Yogyakarta, which is 70.6%. In comparison, the college enrollment rate in Kepulauan Bangka Belitung is 13.2%.

The average college enrollment rate in 2018 in 34 Provinces is 33.67% (see Figure 3). It means that the average population at the age of 19-24 or around 66.33% does not get an education at universities. It can be due to the productive age. People prefer to work rather than have to continue to higher education. The province that has a college enrollment rate value above the average value is D.I. Yogyakarta, Maluku, Southeast Sulawesi, West Sumatra, Aceh, North Maluku, South Sulawesi, Central Sulawesi, Bengkulu, DKI Jakarta, Bali, East Kalimantan, Papua, North Sulawesi, Gorontalo, and Riau.

![Figure 3. College Enrollment Rate in 2018 by Province in Indonesia. (Source: Statistics Indonesia)](image-url)

5. Conclusion
The demographic bonus that is enjoyed by Indonesia and expected to continue to increase until 2030 needs to be put in good use to promote growth and sustainable economic development. Educated and competitive human capital needs to be improved in terms of the number and quality of competitiveness to encourage quality growth and compete with foreign workers.

The role of universities in Indonesia is not yet optimal in supporting Indonesia's economic growth in terms of the number of universities and college enrollment rate that have not impacted economic growth. It is because many provinces still experience inequality in the provision of the number of universities with college enrollment rate.

HDI has a negative impact on economic growth. In improving HDI, it includes three things, namely about longevity and healthy living, knowledge and decent living standards, and money so that economically the community and government focus more on increasing HDI rather than economic growth.
Three suggestions can be submitted in this study for the government and universities in Indonesia. First, the government and universities need to pay attention to accessibility for the community to pursue universities at an affordable price. It can be done by implementing distance learning with the concept of e-learning. Cheap education can also be done by increasing the number of vocational colleges, because currently, 94% are academic-based universities, only 6% are vocational colleges. According to data from the Ministry of Education and Culture in 2018, the number of vocational colleges in Indonesia is only 300 out of 4,760 universities.

Second, the government and universities need to improve the quality of universities to produce quality graduates. The quality improvement can be in the form of an increase in education facilities like the use of technology, the number of classes in line with the increase in the students’ capacity, lecturers' ability, and the education budget coming from the center and the regions.

Last, the government and universities need to encourage the improvement of the competitiveness of its graduates. It can be by increasing the competence following the needs of the world of work, variety of skills needed, and lifelong willingness to learn and encouraging entrepreneurial programs.

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