Research Article

The Rate of Return on Education Investment in South Sumatra Province: An Analysis

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Abstract.
This research was conducted to determine the rate of return on education investment for workers in South Sumatra Province. The data used was obtained from the SAKERNAS for February 2022 provided by BPS and consisted of 2965 selected samples. The analyzed data includes the workers' wages, education level, work experience, gender, economic sector they belong to, and regional category. The results of this study suggest that the level of education, work experience, gender, economic sector, and regional category collectively influence the amount of wages received by the workers. Changes in wages can be attributed to the variables of education level, work experience, gender, economic sector, and regional category, accounting for 19.5% of the observed variance. The remaining 80.5% of the variance is attributed to other variables not considered in this study. Furthermore, the findings indicate that the rate of return on education investment is expected to increase in 2022, corresponding with higher levels of education among the workers.

Keywords: return on education investment, education, experience, gender, economic sector, region

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1. Introduction

Human resources at this time have not been fully utilized ideally, and achieving goals effectively necessitates a strong emphasis on education. Education has proven to enhance human resources, as evidenced by the experiences of several countries. This improvement can be observed through increased knowledge and skills among workers. Moreover, a higher level of education in individuals often correlates with advancements in technology. [1] explain that humans are not merely resources; they represent a form of capital capable of generating returns. Any expenditure made to enhance the quantity and quality of this human capital is considered an investment activity. Consequently, when an individual increases their investment in education, they can expect a higher return that is proportional to the resources allocated to their educational pursuits. In summary, optimizing human resources requires a strong focus on education, as it has the potential to enhance skills and knowledge, leading to greater returns on investment for both individuals and society as a whole.

Based on data from the Directorate General of Population and Civil Registration (Dukcapil) of the Ministry of Home Affairs in 2021, the number of residents in South Sumatra Province with education up to the tertiary level is 446.63 thousand people, which accounts for only 5.26% of the total population of 8.49 million. These figures indicate a relatively low percentage of individuals with higher education in the province. To ensure a competitive labor force, it is essential for these workers to possess the necessary skills and qualifications demanded in the job market. One of the key indicators of their employability is the level of education they have attained. Therefore, improving the quality of skilled human resources becomes imperative. Enhancing the accessibility of education plays a vital role in raising the overall quality of human resources in the region. This can be achieved by providing easy access to educational opportunities and ensuring comprehensive educational facilities and infrastructure are available to support the learning process. Additionally, having qualified educators is crucial in effectively imparting knowledge. By addressing these aspects and investing in education, South Sumatra Province can cultivate a more competitive and capable workforce. This, in turn, contributes to the socio-economic development and progress of the region, as skilled human resources are instrumental in driving growth and innovation across various sectors.

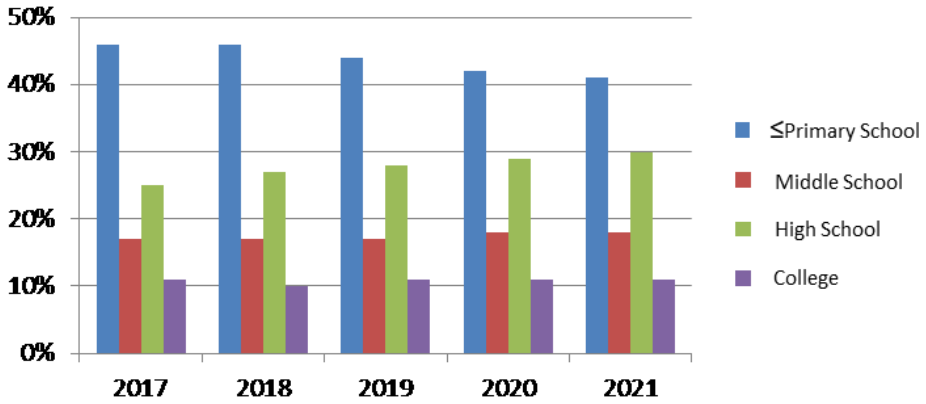

Figure 1: Percentage of Employed Labor Force by Highest Education Completed in South Sumatra Province, 2017-2021. *Source : Badan Pusat Statistik Sumatera Selatan, 2022* [2].

One measure of quality in human resources can be determined by the level of education attained. Higher educational qualifications, such as holding advanced diplomas or degrees, often indicate a higher level of intellectual capacity among the people in a given area. Consequently, the disparity in wages earned by workers is likely to impact labor productivity. Several factors contribute to wage differences, including job training, regional location, level of education, and other related factors. According to data from [3], there are indeed variations in the level of wages received by workers.

Table 1: Average Net Wages/Wages of Informal Workers for a Month by Highest Education Completed (rupiah) in South Sumatra Province.

Year	Highest Education			
	<Primary School	Primary School	Middle School	High School above
2018	1158236	1406955	1582075	1844550
2019	1251397	1557166	1738840	2039585
2020	1085960	1271085	1371053	1638104
2021	1120142	1362037	1419853	1522104
2022	1126900	1227200	1358100	1389600

Source : Badan Pusat Statistik, 2022 [3].

The highest net wages/salaries are predominantly observed among individuals with a high school education level, while the lowest wages are associated with those who have only completed elementary school education or have not graduated from elementary school. From this explanation, it can be inferred that the level of education completed by an individual is positively correlated with the wages they receive. As a result of these wage disparities, labor productivity is inevitably influenced [1].

2. Theory, Literature Review, and Hypothesis

2.1. Literature Review

The study employed full-discounting, short-cut, and HCEF models (using Ordinary Least Square) as well as the Two-Step Heckman method. The findings of this study indicate that in 2015, the rate of return on investment in high school education exceeded that of high school education, while in 2018, the rate of return on investment in vocational education surpassed that of high school education. Moreover, research conducted by [4] reveals that the rate of return on all levels of education in West Kalimantan is 3,83%. This implies that each additional year of schooling results in an average increase of 3,83% in income. Additionally, the rate of return on education investment in the cities of Pontianak and Singkawang is 6,21%.

Gender issues in labor reveal that women have the same level of education as men. However, there are variations in the quality of education and earnings among the labor force across different provinces. Surprisingly, DKI Jakarta province, despite being the capital, has the smallest return on education investment. This study, conducted by [5], highlights that the value of the rate of return on education investment indicates an improvement in the overall quality of education among workers in Indonesia.

2.2. Theory

2.2.1. Human Capital

The concept of human capital was established by Theodore W. Schultz. In his journal, he argues that the concept of human capital essentially encompasses various forms of capital, such as technology, materials, land, machinery, and knowledge [6]. The reflection of human beings in human capital includes diverse elements, such as ideas, skills and creativity, knowledge, and worker productivity.

Investment in human capital is essentially similar to investment in other factors of production. In this context, the rate of return on investment in human capital is also a significant consideration. From the perspective of human capital investment, individuals typically weigh the benefits of continuing education in college against the potential gains they can obtain over time. This decision-making process aligns with the graph shown below:

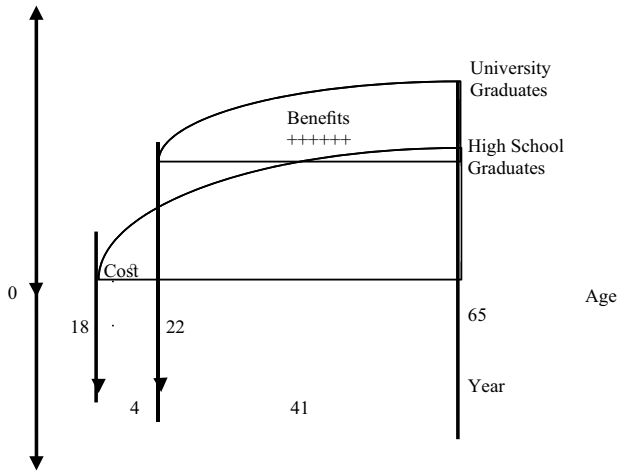

Figure 2: Benefits and Costs of Attending Higher Education. Source : Pascharopoulus, 2006.

2.2.2. Return to Education

In increasing investment in education, an individual will benefit from the return to education. [7] defines the benefits of education as including economic and non-economic benefit models, namely:

Internal or private benefit models are economic (market) and non-economic (non-market). Economic (market) includes; (a) increased income, (b) ability to enter the workforce, (c) decreased unemployment, and (d) elasticity in the labor market. Meanwhile,

the non-economic (non-market) model includes effective consumption and improved health in the family.

The external or private social benefit model also has economic (market) and non-economic (non-market). Economic (market) includes; (a) increased productivity, (b) increased income from taxes, and (c) reduced dependence on the government. Meanwhile, the non-economic (non-market) model includes; (a) decreasing the criminal rate, (b) shrinking infectious diseases, (c) increasing the level of care, and (d) being able to democracy appropriately.

2.2.3. Worker Wages

Income is the acquisition or reward earned by an individual or a household as a result of their efforts in the form of materials or goods obtained during a specific period of time. The Mincerian model elucidates the factors that influence wage levels in the labor market. Labor wages are affected by various aspects of human capital and education possessed by the workforce, using variables such as work experience and age. The Mincerian equation is frequently employed in research on education return on investment. In essence, the Mincer model highlights a robust relationship between wages and factors that impact human capital investment, including education and experience. Data, such as the number of years of schooling, are often required to estimate the return on education and to make comparisons across countries, even when they have different education systems [8].

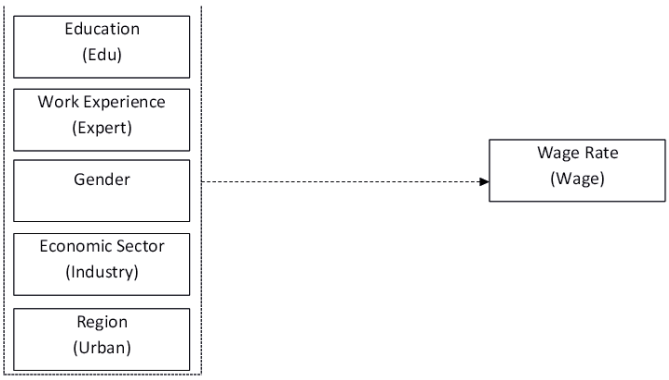

Figure 3: Thought Groove.

Description:

= Simultaneous test

The hypotheses that can be formulated in the study are as follows:

1. It is hypothesized that the level of education influences the amount of wages received by workers.
2. It is hypothesized that work experience influences the amount of wages received by workers.
3. It is hypothesized that gender (sex) influences the amount of wages earned by workers.
4. It is hypothesized that the economic sector influences the amount of wages earned by workers.
5. It is hypothesized that the rural-urban area category influences the amount of wages received by workers.
6. It is hypothesized that the rate of return to education will increase in accordance with the number of years of education pursued by an individual.

3. Research Methods

This study uses data obtained from SAKERNAS conducted annually by the BPS of South Sumatra Province. The type of data used in this study uses secondary micro data in the form of cross section data. Based on micro data from SAKERNAS February 2022, the total data in South Sumatra Province amounted to 6336 people, then selected based on data processing, namely selecting monthly wages if in a population where there are no wages or equal to zero, and then selecting ages under 25 and over 65 years, so that the data selection process becomes 2965 people.

The rate of return on education investment is calculated using the results of multiple linear regression analysis. Multiple linear analysis is utilized in this study because it involves two or more independent variables. To calculate the rate of return on education investment, Mincer's income function is employed, which utilizes lifetime wages that follow an inverted U curve or the pattern of age-earning profiles. This leads to the use of natural logarithms and quadratic equations to obtain a linear equation.

$$L_n W_i = \beta_0 + \beta_1 Edu_i + \beta_2 Exp_i + \beta_3 Exp_i 2 + \epsilon_i \quad (1)$$

Where explained; W_i: income of individual i, Edu_i: education level of individual i, Exp_i: work experience of individual i, Exp_i^2: squared work experience of individual i, ϵ_i: error term.

For regression,

$$In\left(Wage_i\right) = \beta_0 + \beta_1 middlesch_i + \beta_2 highsch_i + \beta_3 diploma_i + \beta_4 univ_i + \beta_5 expert_i + \beta_6 expert_i^2 + \beta_7 gender_i + \beta_8 industry2_i + \beta_9 industry_3 + \beta_{10} urban_i + \epsilon_i \quad (2)$$

Where explained; ln(wage$_i$): natural log of individual wage i, expert$_i$: work experience (years), exper$^2{}_i$: square of work experience (years), gender$_i$: gender dummy variable which includes male and female, urban$_i$: region category dummy variable which includes urban and rural, industry1: industry 1 dummy variable (primary sector as reference), industry2: industry 2 dummy variable (secondary sector), industry3: dummy variable for industry 3 (tertiary sector), primarysch$_i$: dummy variable for primary school level as reference, middlesch$_i$: dummy variable for junior high school level, highsch$_i$: dummy variable for senior high school level (senior high school and vacation), diploma$_i$: dummy variable for diploma level (D1, D2, D3, D4), univ$_i$: dummy variable for university level (S1, S2, S3), and ϵ_i: error term. With the model of equation (1), to calculate the average rate of return on education investment can refer to the method used by [9], namely:

$$r_k = \frac{\beta k - \beta_{k-1}}{nk} \times 100 \quad (3)$$

Where explained; r$_k$: rate of return on investment in education, β_k: regression coefficient of years of education, β_{k-1}: regression coefficient of lower years of education, n$_k$: years of schooling.

4. Results and Discussion

4.1. Descriptive Research Variables

The discussion will be presented through descriptive analysis of the dependent and independent variables. The statistical results of the variables used in this study are shown in Table 4.1 below:

As observed in Table 4.1, each value of the minimum, maximum, average (mean), and standard deviation is provided for a total of 2965 samples in the study.

4.2. Monthly Wages

The average monthly wage is Rp 2.149.239,- with the lowest wage recorded at Rp 30.000,- and the highest wage reaching Rp 50.000.000,- then the standard deviation

TABLE 2: Descriptive Statistical Analysis.

Variable	Minimum	Maximum	Average	Std. Deviation
Wage Rate	30000	50000000	2149239,06	2320178,241
Work Experience	0	53	26,21	11,963
Work Experience^2	0	2809	830,10	674,307
Observation : 2965				

Source : SAKERNAS Data February 2022 (processed).

value is Rp 2.320.178,-. These figures indicate a relatively large gap or difference in the data, as the average (mean) monthly wage is lower compared to the standard deviation value.

4.3. Education

The table shows the percentage and frequency of each group in Table 4.2 below:

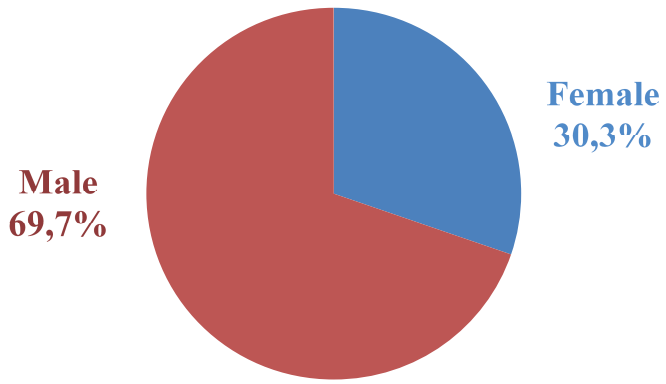

Figure 4: Percentage of Labor in South Sumatra Province by Education in 2022. *Source: SAKERNAS Data February 2022 (processed).*

In 2022, the majority of workers in South Sumatra Province completed their education at the elementary school level or did not graduate from elementary school, accounting for 29,2% of the workforce. On the other hand, a small percentage of workers in the province have reached the Diploma level of education.

4.4. Work Experience

The table shows the percentage and frequency of each group in Table 4.2 below:

Table 3: Frequency of Labor in South Sumatra Province By Work Experience in 2022.

Expert	Frequency	Percengage
0 - 7	149	5
8 - 15	459	15,5
16 - 23	686	23,1
24 - 31	709	23,9
32 - 39	500	16,9
40 - 47	301	10,2
48 - 55	161	5,4
Observation : 2965		100

Source : SAKERNAS Data February 2022 (processed).

In Table 4.2, it is evident that the percentage of workers decreases as work experience increases. This indicates that younger workers tend to be more prevalent compared to older workers. The higher proportion of young workers points to the promising productivity potential of the human resources in the region. The average work experience is 26,21 years, with a standard deviation value of 11.96 indicating a considerable variation in the distribution of labor experience data. To examine whether there is a diminishing effect of work experience on wages, the variable of increasing work experience or work experience squared (expert^2) is utilized. This allows for an investigation of whether the relationship between work experience and wages follows an inverted U-curve pattern, where the wage growth initially accelerates but later decelerates as work experience increases.

4.5. Gender

Gender or sex If seen from the frequency, it can be seen in Figure 4.2:

It is suspected that the total number of male workers is 69,7% higher than the total number of female workers due to societal expectations, where men are often required to be the main breadwinner or provide financial support in the household. As a result, men are more frequently encouraged to work to fulfill the household's needs.

4.6. Economic Sector

The frequency of economic sectors can be seen in Table 4.3 below:

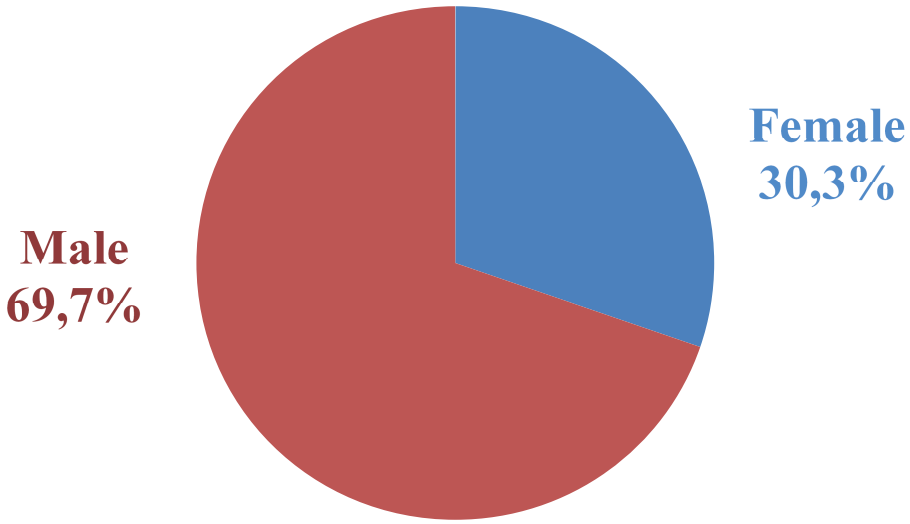

Figure 5: Percentage of Labor in South Sumatra Province by Gender in 2022. *Source: SAKERNAS Data February 2022 (processed).*

Table 4: Frequency of Labor in South Sumatra Province By Economic Sector in 2022.

Ekonomic Sector	Frequency	Percentage
Industry1	1461	49,3
Industry2	176	5,9
Industry3	1328	44,8
Observation	2965	100

Source : SAKERNAS Data February 2022 (processed).

It is suspected that the majority of workers in South Sumatra Province work in industry1, which belongs to the primary sector. This is likely due to the fact that companies in the primary and tertiary sectors provide more employment opportunities, and workers in these sectors tend to receive higher wages compared to other sectors.

4.7. Region

The regional category (urban) when viewed in terms of frequency is shown in Figure 4.3 below:

The percentage of workers employed in urban areas is higher because there are more applicable sectors in urban areas, and there are also more job opportunities available in urban areas. In addition, cities tend to experience faster development of technology and information compared to rural areas.

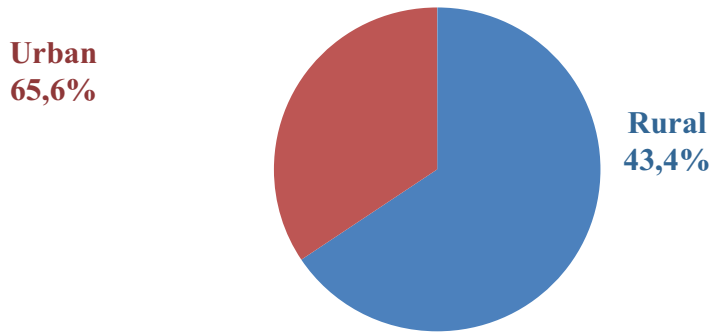

Figure 6: Percentage of Labor in South Sumatra Province By Regional Category in 2022.
Source: SAKERNAS Data February 2022 (processed).

4.8. Multiple Linear Regression Estimation Test Results

In this study, the SPSS version 22 application was used for analysis. The results of the analysis are shown in Table 4.4 as follows:

Table 5: Multiple Linear Regression Results.

Variabel	Label	Coefficient	Standard Error
Edu	Middlesch	0,061	0,042*
	Highsch	0,305	0,039***
	Diploma	0,664	0,095***
	Univ	0,785	0,059***
Exp	Expert	0,038	0,005***
	$Expert^2$	-0,001	0,000***
Gender	Gender	0,572	0,031***
	(1 = Male; 0 = Female)		
Industry	Industry2	0,216	0,061***
	Industry3	0,101	0,035***
Urban	Urban	0,167	0,033***
	(1 = Urban; 0 = Rural)		
Constan	Cons	13,045	0,080***
R-squared		0,195	
F Count		71,373	
Prob > F		0,000	
Observation		2965	

Source : SAKERNAS Data February 2022 (processed). Description: *** : significance α = 0,01; ** : significance α = 0,05; * : significance α = 0,10.

After the analysis shown in Table 4.4, the regression equation will be established, as follows:

$$\begin{aligned} Ln\left(Wage_i\right) = {} & 13,045 + 0,061middlesch + 0,305highsch + 0,664diploma \\ & + 0,785univ + 0,038expert - 0,001expert^2 \\ & + 0,572gender + 0,216industry2 + 0,101industry3 + 0,167urban \end{aligned} \quad (4)$$

The following is a discussion of the multiple linear regression equation in accordance with Table 4.4:

1. The level of education, work experience, squared work experience, gender, economic sector, and regional category collectively have a simultaneous influence on the amount of workers' wages. The independent variables explain 19,5% of the changes in wage amounts, while the remaining 80,5% is attributed to other variables not considered in this study.

The estimation results show that all coefficients of the education level exhibit positive values. The middlesch (middle school) category does not differ significantly from other education levels concerning their effect on wage levels.

The regression coefficient of work experience has a positive direction, indicating that every 1-year increase in work experience can raise the wage amount by 3,8%. However, the regression coefficient value of the squared work experience variable is -0,001, suggesting a negative effect on wages. This means that as work experience increases, it has a negligible impact on the wage amount.

The regression coefficient value for gender is 0,572 indicating that male workers' wages are 13,167 higher when compared to female workers' wages.

Both the secondary sector and tertiary sector have a significant influence on wage amounts, and there is a difference in the level of influence between workers in these sectors.

The regression coefficient for the regional category is 0,167 which implies that wages of workers in urban areas are 13.212 higher than the wages of workers in rural areas.

The average return on investment in education can be calculated based on the Deokalikar method [9] using the average value of the last year of education completed by workers, in accordance with the decision of Law No. 3 of 2020, as described in Figure 4.4 below.

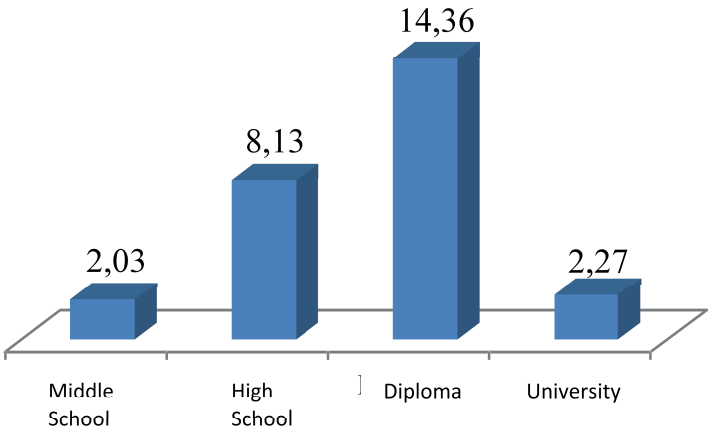

Figure 7: Rate of Return on Labor Education in South Sumatra Province in 2022.

Based on the calculations, the highest rate of return to education for workers in South Sumatra Province in 2022 is at the Diploma level, not at the University level.

5. Implications, Limitations, and Suggestions

5.1. Implication

The level of education, work experience, gender, economic sector, and regional category collectively have a significant influence on the amount of workers wages in South Sumatra Province in 2022. When considering the individual influence of the middlesch variable, it does not differ significantly from other education levels. However, the variables highsch, diploma, univ, gender, industry2, industry3, and urban differ significantly from other variables in their impact on workers wages. Investment in diploma education has the highest rate of return on education investment when compared to other education levels.

5.2. Limitations and Suggestions

The variables tested in this study are still limited, focusing only on analyzing the level of education, work experience, gender, economic sector, and regional category's impact on wage amounts. For future researchers, it would be beneficial to include additional independent variables, such as working hours, training, and type of work, to gain a more comprehensive understanding of the factors influencing workers wages.

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