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Jurnal Public Policy

| ISSN (Print) 2477-5738 | ISSN (Online) 2502-0528 |



The analysis of Vertical Mismatch and Manufacturing Labor Wage By Using Cramer's V Method

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ARTICLE INFORMATION

Received: January, 23, 2020
 Revised: February, 28, 2020
 Accepted: March, 12, 2020
 Available online: April, 01, 2020

KEYWORDS

Wage, Vertical Mismatch, Overqualified, Training, Generation, Cramer's v

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A B S T R A C T

As the leading sector of the national economy through its contribution, the manufacturing industry sector in Indonesia was precisely filled with the dominance of vertical mismatch or mismatch between education levels and types of work based on the 2015 National Labor Force Survey (Sakernas). The negative effects of vertical mismatch have an impact on the low wages earned by labor because investment at the education level is not maximally used when working. This paper aims to study the tendency of vertical mismatch to labor wages in the manufacturing industry sector by training, education level, region, & generation using descriptive analysis methods (crosstabulation & graphics) and Cramer's V to see the correlation with August 2018 Sakernas data. The results of research with the total sample of 1,259 workers shows that vertical mismatch is significantly related to labor wage with the tendency of workers who are overqualified to face low wages. In addition, overqualified workers occur in all regions of Indonesia with the characteristics of younger generations and Diploma IV / SI graduates. The conclusion of this paper is that industrial labors in Indonesia are still classified as overqualified and experience low wages. The efforts that need to be done are improving the skills of workers through training so as to have a positive effect on mismatch workers to obtain higher wages

INTRODUCTION

The magnitude of wages as workers compensation is closely related to their education level. In other words, the higher a person's level of education will increase their wages when they've already worked (Levels et al., 2014). Mismatch between types of work and education (job mismatch) also had an effect on worker's wage (Iryanti, 2017). The existence of this job mismatch would have a negative impact on low income for workers because their investment in education was not maximally used (Amador et al., 2006).

When viewed from the education structure of workers in Indonesia showed an increase at quality of education every year (BPS, 2018a). Unfortunately, the improvement at quality of workers through education has not yet been followed by the distribution of the number of workers according to the highest completed education level with the distribution of education level that needed by certain types of work. The phenomenon which occurred in industrial markets showed that workers with higher education level filled jobs that were not in accordance with their education level (lower). Conversely, those with low education actually filled jobs that were higher than education level they had (Wiko & Junaidi, 2011). This condition creates a mismatch at labor market.

More than half of workers in Indonesia were classified as incompatible between work and education level or well known as vertical mismatch (Samudra, 2018). On the other hand, as the

leading sector of the national economy through its contribution over the past five years (see Figure 1), the manufacturing industry sector is actually filled with the dominant workers with vertical mismatch characteristics (see Figure 2). This certainly provided risks for workers such as sub-standard wages and high turnover (Bender & Heywood, 2006). The next effect had an impact on the decline in productivity and growth of the industry (Iryanti, 2017).

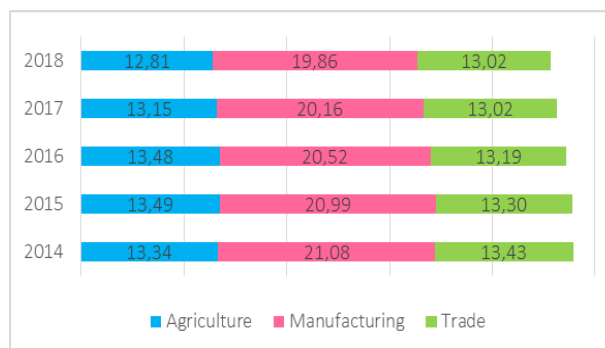


Figure 1. Three Sectors with The Largest Contribution towards Indonesia's GDP, 2014-2018 (%)

Source: BPS (2018b)

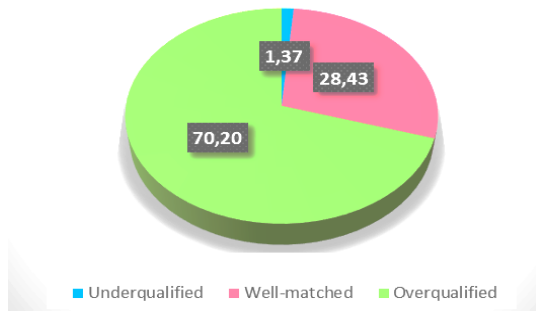


Figure 2. Vertical Mismatch Labor of Manufacturing Industry Indonesia (%)

Source: Samudra (2018)

One of the government's policies to increase the competence of tertiary education graduates to match the needs of the laborforce is the Certified Student Internship Program (CSIP). This program has been agreed by the Ministry of Research, Technology and Higher Education (Kemenristekdikti) in collaboration with the Ministry of SOEs (BUMN) on March 20th, 2019. Minister of Kemenristekdikti, Mohamad Nasir said that through this program, participants will obtain a certificate of competence recognized by labor market. By obtaining the certificate, it is expected to be able to increase the link and match between universities as creators of quality human resources and industries as graduates users. CSIP is also one of the important steps to produce qualified, competitive and ready-to-work Indonesian human resources (Bureau of Public Cooperation & Communication, 2019).

Previous studies in Indonesia focused on analyzing mismatches workers toward wages for all sectors generally in a given year using the Mincer Equation Model. While this paper will be more specifically discussed with mismatch workers at manufacturing industry sector using the Cramer's V method which has never been applied in previous studies. The choice of the industrial sector is caused by the sector has a major contribution to Indonesia's economic growth if it is supported by the quality of Human Resources in accordance with market needs. In addition, this paper links CSIP policies that can be approached with certified training experience variables through questions in Sakernas August 2018.

Based on the background description and problems above, the high percentage of vertical mismatch phenomena in the manufacturing sector is suspected to have an impact on low income for workers. So researcher is interested in conducting a further research deals with the title "The Analysis of Vertical Mismatch and Manufacturing Labor Wage by Using Cramer's V Method". The purpose of this paper is to study the correlation and tendency of vertical mismatch workers to their income based on their training, education level, region, and generation.

Human Capital Investment

Improving the quality of human capital through education investment will have an impact on the magnitude of labor income when they enter the labor market. This correlation between education and income was illustrated through the theory of the wage-schooling locus (Borjas, 2016) which illustrated that workers who were graduates of tertiary education would receive higher wages than those with less education. This is reinforced by Todaro & Smith (2012) who

stated that the expectation of a highly educated student will find a job with a large income in the modern sector.

Wage

Wage is a reward/repayment for a month in the form of money and goods received by someone who works with an employee/labor status (BPS, 2018a). The magnitude of wage as compensation for workers was closely effected to their level of education (Levels et al., 2014). Sukirno (2010) mentioned differences in ability, expertise and education were important factors of the difference at worker salary. Income differences would be seen clearly according to education level and potential job experience (Payaman, 2001).

Vertical Mismatch

Vertical mismatch was a mismatch between education level with education level qualifications to fill certain types of work (Allen, 2016). This mismatch was grouped into 3 criteria, namely underqualified (education level < education level qualification in certain types of work), well-matched (education level = education level qualification in certain types of work), and overqualified (education level > education level qualification in certain types of work) where underqualified + overqualified = mismatch.

Overqualified had a substantial effect on wage penalties in both short and long term (Korpri & Tahlin, 2007). This was reinforced by the results of Levels et al. (2014) research where the wage effect of overqualified was half greater than well-matched and the effect for underqualified was lower than overqualified. Samudra (2018) & (Alisjahbana et al., 2018) in their research also showed that workers who were overqualified would reduce their real wages. This was also in line with the negative impact of vertical mismatch for workers, namely below standard wages for those who were overqualified, job satisfaction decreased and risks increasing turnover (Bender & Heywood, 2006). While for companies, reduced productivity and company growth (Robst, 2006). As for the community, human resources were not optimized and lost income tax income (Iryanti, 2017).

Training, Mismatch, and Wage

To increase productivity, industry generally provide training to workers as a form of increasing their competency while working. The study of Soesilowati (2009) resulted that the training variable was a dominant factor in influencing worker productivity in Banten. The higher their productivity would increase their income. Samudra (2018) also said that training can be used as a low-cost chusion for mismatch workers. This means that those who get training tend to increase their wages compared to those who don't get training.

Generation, Region, Mismatch, and Wage

The generation at this paper is grouped into 4 which are adjusted to the age of the unit of analysis, namely 18-64 years old, the baby boomers were born in the range of 1946-1964, Gen X (1965-1980), Millennials (1981-1994) and Gen Z (1995-2010) (Adioetomo, 2019). Alisjahbana et al. (2018) research said that millennials tended to over-education. Over-education provided Millennials with the highest premium wage while provided penalty wage for under education for Gen X. Then overqualified workers had relatively high proportions for all region in Indonesia. Although the island of Java had the largest

overqualified proportion in 2015, it didn't show any clear regional patterns (Samudra, 2018).

METHOD

Data Types and Data Sources

The data used in this paper is secondary data and is obtained from Statistics Indonesia (BPS) that sourced from the National Labor Force Survey (Sakernas) in August 2018. The observation unit in this paper is 18-64 years of labors with the last education completed at least Diploma I/II and working at manufacturing industry sector. While the unit of analysis is educated labors classified as vertical mismatch. The number of samples in this paper are 1,259 labors of 36.744 workers who work at manufacturing industry.

Analysis Method

In this paper, to analyze the conditions of labor wage in Indonesia based on the characteristics of vertical mismatch, training, education level, region, and generation will be viewed in form of table and graph descriptively. To classify a manufacturing industry labor as vertical mismatch can be seen in Table 1. While to find out the correlation between nominal-scale data variables, we can use C (Cramer's V) contingency analysis. The use of Cramer's V analysis is more appropriate for contingency tables of more than 2x2. This is consistent with the research variables in this paper that relate vertical mismatch variables (nominal scale with 3 categories) and worker income variables (nominal scale of 5 categories).

Table 1. Classification of Vertical Mismatch

Type of Occupation	Primary education level	Secondary education level	First stage of tertiary education	Second stage of tertiary education
	Up to Elementary School	Junior and Senior High School	Diploma I/II	Diploma III to Doctoral
1. Managers	U	U	M	O
2. Professionals	U	U	U	M
3. Tehnicians and Associate Professionals	U	U	M	O
4. Clerical Support Workers	U	M	O	O
5. Services and Sales Workers	U	M	O	O
6. Skilled Agricultural, Forestry and Fishery Workers	U	M	O	O
7. Craft and Realted Trade Workers	U	M	O	O
8. Plant and Machine Operators and Assemblers	U	M	O	O
9. Elementary Occupations	M	O	O	O

Source: Allen (2016); ILO (2012); Samudra (2018)

Notes: U: Underqualified, M: Well-Match, O: Overqualified

The Cramer's V analysis test is seen with its p-value, if Cramer's $V < \alpha$ then the vertical mismatch variable has a correlation with the variable of worker income. Meanwhile, to see tendency between variables can be seen from the crosstabulation table (Yamin & Kurniawan, 2009).

RESULT AND DISCUSSION

Vertical Mismatch by Education Level

Labors at manufacturing industry sector in Indonesia based on data from Sakernas August 2018 are mostly filled by those with a Diploma IV/Bachelor (S1) education (see Figure 3). As many as 65 percent of DIV/S1 graduates from 1,259 educated

labors work at this sector, followed by graduates of DIII, DI/DII and the lowest is at the level of Master (S2)/Doctoral (S3) education, the proportion is less than five percent.

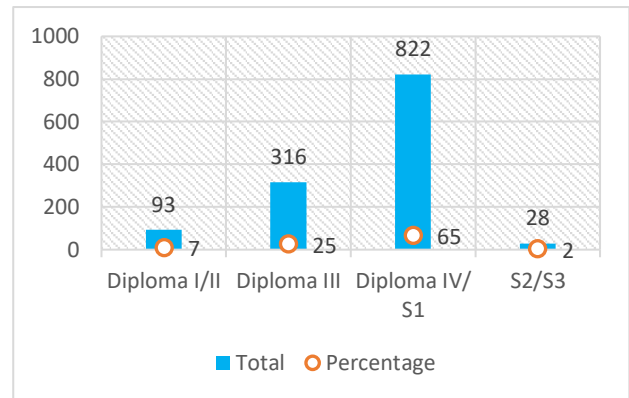


Figure 3. Distribution of Labor in the Manufacturing Industry Sector by Education Level in Indonesia, 2018

Source: Results of Sakernas August 2018

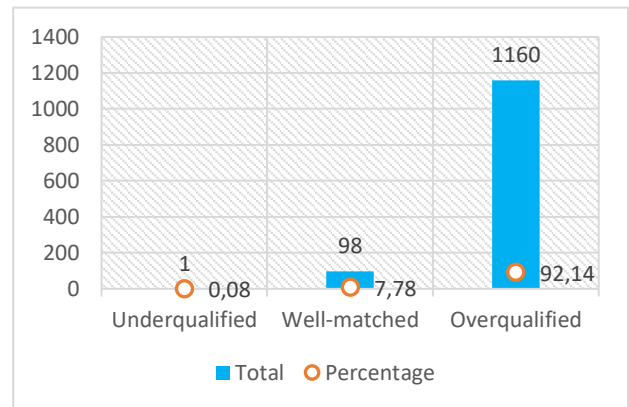


Figure 4. Vertical Mismatch Labor in the Manufacturing Industry Sector by Region in Indonesia, 2018

Source: Results of Sakernas August 2018

When viewed from discrepancy level between education level with type of work or commonly known as vertical mismatch, labors at manufacturing sector are dominated by overqualified characteristics (see Figure 4). This shows education level of labors at business field is higher than the qualifications of education to fill certain type of work. While those classified as well-matched were only 7 percent. This is unfortunate because their investment through education is not maximally used when they are in labor market.

Vertical Mismatch by Region

Based on Figure 5 does not show a certain pattern for vertical mismatch labors between islands in Indonesia. It can be said that the phenomenon of overqualified does not only occur on certain islands and more than 90 percent of the proportion of labors at manufacturing industry are classified as vertical mismatch. Even the majority of Java is filled with educated labors and the largest industrial centers among other islands don't reach ten percent of labors who enter the well-matched. The results which didn't form a certain pattern between the islands was in line with Samudra (2018) studies for the vertical mismatch conditions in Indonesia generally in 2008 and 2015.

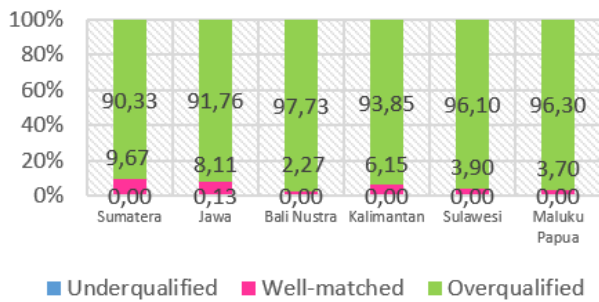


Figure 5. Vertical Mismatch Manufacturing Industry's Labor by Generation in Indonesia, 2018 (%)
Source: Results of Sakernas August 2018

Vertical Mismatch by Generation

Seen from inter-generation calculated based on birth cohort of labors at industrial sector, it shows that the younger generation tends to be higher in proportion to being classified as overqualified compared to the previous generation. From Figure 6 informs that the generation of labor was born in 1946-1964 (baby boomers) is the generation which is the most well-matched compared to other generations that reach almost 15 percent. This large proportion is very reasonable because they are more senior or first enter the labor market so they have a lot of experience to improve their competence in working. This competency improvement can be like attending training/courses and even continuing their education level to suit the type of work. As in the baby boomers generation, manufacturing labors in the 38-53 year age range (Gen X) also have a proportion of more than 10 percent.

It is different when labors are the younger generation, Millennials and Gen Z. The two generations tend to have the same characteristics, namely more than 95 percent of labors are classified as overqualified. The high percentage is caused by they are classified as young workers which means they are still said to be new workers entering the industrial market. For those who are fresh graduates are faced with two choices when entering the labor market that is working or waiting to get a job that is appropriate to their education level. Generally they choose any work to add to their work experience without regarding to education level they have so they choose to work in certain types of work that have lower occupational education qualifications in order to have a great chance of being accepted as workers. In addition, the characteristics of workers at this generation prioritize the balance between lifestyle and work so that they tend to look for work that can support this and still be able to do the hobbies they like (Adioetomo, 2019). This certainly has an impact on the choice of the type of work they choose when they want to enter the labor market.

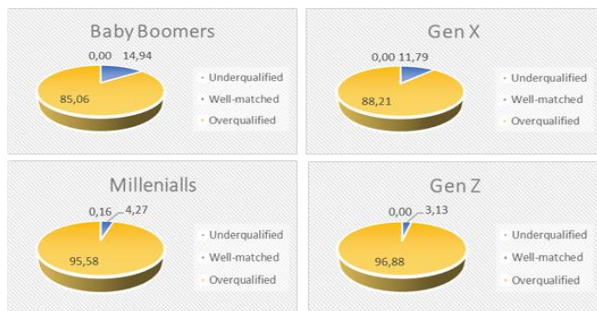


Figure 6. Vertical Mismatch Manufacturing Industry's Labor by Generation in Indonesia, 2018 (%)
Source: Results of Sakernas August 2018

Labors by Region and Wage

The data presented in Figure 7 shows that educated labors who work in the manufacturing industry sector are concentrated in the Jawa region, followed by the Sumatera and Kalimantan regions. While the regions of Sulawesi, Maluku & Papua are areas with a minimum of educated labors in these business fields. The high percentage of labors in the western region of Indonesia is supported by the number of industries and education infrastructure which are indeed more dominant than those in eastern Indonesia.

When viewed according to income structure, they who work in the manufacturing sector in Jawa generally have a wage of 5-7.5 million rupiah per month. Not a few others who earn more than 7.5 million rupiah. Conversely, labors in eastern Indonesia tend to have incomes of less than 2.5 million per month. The difference in the quality of Human Resources and the availability of an adequate number of industries in the region is a factor in the difference in the level of income they receive.

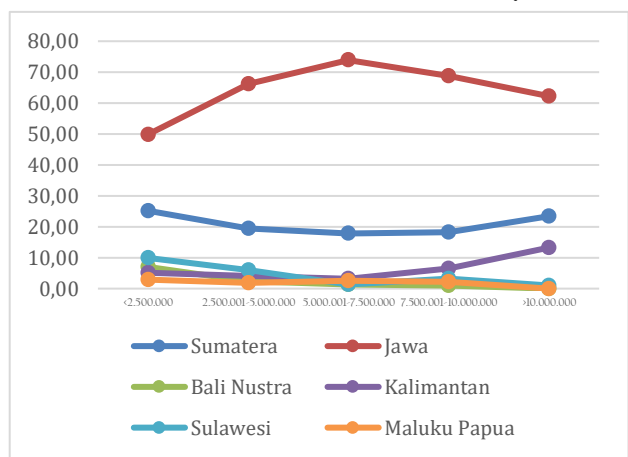


Figure 7. Manufacturing Industry's Labor by Region and Wage in Indonesia, 2018 (%)
Source: Results of Sakernas August 2018

Labors by Generation and Wage

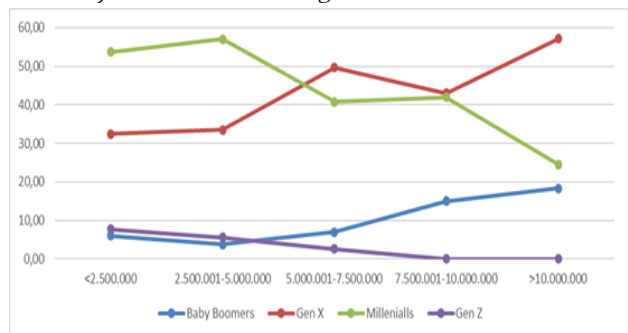


Figure 8. Manufacturing Industry's Labor by Generation and Wage in Indonesia, 2018 (%)
Source: Results of Sakernas August 2018

Manufacturing industry labors for the younger generation, Millennials and Gen Z, tend to have lower monthly income than the older generation, Baby boomers and Gen X. The wage for the younger generation is in the range of under 5 million, while the old generation has an average income of more than 10 million rupiah. This difference in income is due to more years of work and experience in the generation of baby boomers and Gen X compared to Millennials and Gen Z.

When connected with Figure 6 which shows that the majority of the younger generation is overqualified compared to the older generation and Figure 8 which shows that the young generation has lower wage. It indicates that job mismatch has a close correlation with the level of labor income obtained. In other words Millennials and Gen Z tend to be overqualified with lower income levels than Baby Boomers and Gen X generations.

Vertical Mismatch, Training and Labor Wage

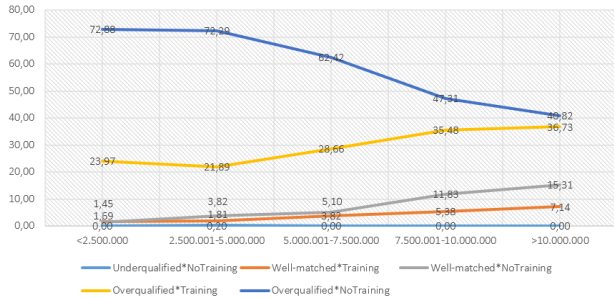


Figure 9. Vertical Mismatch and Training Experience on Manufacturing Labor Wage in Indonesia, 2018

Source: Results of Sakernas August 2018

Based on the data presented in Table 1 which indicates that overqualified labors tend to face penalty wage, a control is needed to reduce their wages, namely training experience. (Borjas, 2016) in his wage equality theory said that on job training given to workers will have a positive effect on the wages they will receive. Figure 9 shows that overqualified labors who did not receive training tended to have lower incomes, most of whom only had income below 5 million rupiah. While most of the overqualified labors who received training received premium wage, which was above 5 million rupiah. This result is in line with research by Alisjahbana et al. (2018) & Samudra (2018) who say that training can act as a "chusion" of low wages for labors classified as mismatch.

On the other hand, labors who are already well-matched, whether they receive training or not, tend to indicate that they are getting higher wages. This does not really have an effect on the wages of match labors because they have basically utilized their knowledge, skills and expertise through their education with suitable types of work. This income increase tends to be driven more by the experience and years of work they have continued to grow.

Correlation of Vertical Mismatch with Labor Wage

Based on the analysis results of C (Cramer's V) contingency coefficient, Cramer's V p-value of 0,000 means that this value is less than $\alpha = 0.05$, then the conclusion is that there is a significant correlation between vertical mismatch and labor wages level at manufacturing industry sector. When seen from the crosstabulation table (see Table 2) shows that labors at manufacturing industry sector that are overqualified tend to have a monthly income below 5 million rupiah while those who are said to be well-matched have an income of more than 5 million each month. This shows that mismatch workers will receive a penalty wage or lower wages compared to those who match. These results are in line with research by Alisjahbana et al. (2018); Amador et al. (2006); Korpri & Tahlin (2007); Samudra (2018) who said that overqualification will have an impact on low real wages both short and long term.

Table 2. Vertical Mismatch and Manufacturing Labor Wage in Indonesia, 2018

Vertical Mismatch	Income Level				
	<2,500,000	2,500,001-5,000,000	5,000,001-7,500,000	7,500,001-10,000,000	>10,000,000
Underqualified	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)
Well-matched	14 (14%)	28 (29%)	16 (16%)	18 (18%)	22 (22%)
Overqualified	399 (34%)	469 (40%)	141 (12%)	75 (6%)	76 (7%)

Source: Results of sakernas August 2018

If it is related to Borjas (2016) theory which stated that those who are highly educated would benefit in the future as a form of returning their education such as high wages, this contrasts with the results of this paper which states contempt. To reduce the mismatch labors in order to get premium wage, according to the results of the previous descriptive analysis, workers in the manufacturing industry sector need to get training as a form of increasing their expertise so that productivity increases which will ultimately have an impact on increasing their incomes.

CONCLUSION

This paper analyzes vertical mismatch labors at manufacturing industry sector based on demographic characteristics and is associated with income. The results obtained in general are overqualified labors in the manufacturing sector in fact occurring in all regions of Indonesia with a very high proportion. The majority of them are labors of the younger generation with educational background of Diploma IV/S1 level. While statistically, vertical mismatch is significantly related to labor wages with a tendency for overqualified labors to face wage penalties or low wages.

Interestingly, when overqualified labors who have received training tend to be in a higher income group than those who did not receive training. This reflects that training is very important for workers classified as mismatch to overcome the effects of low wages when they work and the higher education curriculum is constantly updated in accordance with current and future labor market demands so that labor absorption continues to increase in accordance with their educational levels.

With the large proportion of workers who mismatches for those with high education, the role of the Certified Student Internship Program (CSIP) policy is very important to be applied in order to be able to increase the link and match between universities as creators of quality human resources with industry as graduates users. This is shown by the experience of training that is able to increase their wages for mismatch labors even more so for those who are well-matched.

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