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Reducing Youth Unemployemt Through Technical and Vocational Education and Training

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Abstract

With a large youth population, Indonesia faces both the challenge and the opportunity to increase its capacity and maximize its contribution to the country's economic growth. Technical and Vocational Education and Training (TVET) is an avenue to connect school and workplace environments directly and accelerate its graduates employed in the very early stage of their careers. However, existing TVET institutions, especially in upper secondary education, still need to be improved due to their low employment rate compared to other graduates from different educational streams. Using quantitave and qualitative approaches, this research aims at analyzing the impact of TVET on employment and wage levels and identify financial strategies that can be implemented to improve TVET graduates' quality. Based on quantitative analysis using entropy balancing and instrumental variable method, the impact of vocational secondary school on employment and wage levels is more prominent in the younger graduates and diminished in the older age group. This situation raises concerns about how to strengthen existing TVET institutions so they can provide updated skills and knowledge and maintain TVET graduates' competitive advantage throughout their careers.

Key words : Vocational Education, Financial Strategy, Entropy Balancing, Instrumental Variablel

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INTRODUCTION

In some countries, youth are nearly three times as likely to be unemployed compared to adults and more likely to be employed in the informal sector (Tripney et al., 2013). Their achievement could explain the degree of countries' youth unemployment rate in the quality of education. For example, in MENA countries, there is a significant and robust negative relationship between the higher quality of the education system on the youth unemployment rate (Farzanegan & Gholipur, 2021). The below-average human capital could explain the worse labor market condition faced by youth

compared to adults. Short-term education can provide general competencies to youth, but job-specific technical competencies can be gained long-term in a specific job (Pastore, 2018).

Indonesia is the 4th biggest population country in the world after the United States of America. Based on August 2020 data, Indonesia has 270,043,414 citizens, more than 75% of whom are 203,972,460 aged 15 years and over. Based on August 2020 data, Indonesia has more than 138 million active workers, with around 9.7 million of them (7.07%) unemployed (BPS, 2020). Among the unemployed, 20.46% of them, or 4.4 million are youth, people aged between 15-24 years old. This percentage increased by 1% from 19.44% in 2019 (BPS, 2020).

Technical and Vocational Education and Training (TVET) is a combination of education, training, and skills development relating to a wide range of occupational fields, production, services, and livelihoods (UNESCO, 2015). Through TVET, youth will obtain the skills required to access the labor market, including skills for self-employment (UNESCO, 2016).

Indonesia has formal and nonformal TVET institutions. Formal institutions consist of vocational upper secondary schools and post-secondary vocational (polytechnics), both subject to Ministry of Education and Culture (MoEC) regulations (World Bank, 2020). The nonformal institutions are training or course providers that usually are short-term and under the regulations of MoEC, the Ministry of Manpower (MoM), and several line ministries. Vocational upper secondary education is designed to lead directly to labor market entry, while general education aims to prepare students for tertiary education (OECD, 2020). Post-secondary vocational offers a strong connection with the labor market, close collaboration with employers, and well-functioning pathways in the education system (OECD, 2012).

In 2006, the Indonesian Government released a strategy to encourage the development of TVET institutions, especially at the upper secondary education level. The Government planned to shift the proportion between vocational and general upper secondary education with more focus on vocational secondary education (MoNE, 2007). It seemed to be consistent with the plan. Based on 2019-2020 Education Statistics, the proportion of vocational and general upper secondary schools was 51: 49 (MoEC, 2020a, 2020c). The proportion of vocational and general secondary students was also similar, 52:48. This figure indicates the increasing popularity of TVET institutions in Indonesia, especially at the upper secondary level.

TVET system in Indonesia faces a problem with the employment rate of its graduates. In 2020, the unemployment rate of vocational secondary school graduates was 13.55%, the highest among other educational streams (BPS, 2020). In vocational higher education, the unemployment rate of vocational institutions graduates (Diploma I/II/III/Academy) is also higher than university graduates, which indicates a gap between the labor supply available in the market and the demand from the industry. The absence of linkage between vocational education institutions and employers causes the inability of vocational education to generate graduates who are ready and able to enter the labor market (Ramadhani & Rahayu, 2020).

Another essential characteristic of the Indonesian TVET is that this educational institution becomes the first choice of students from low-middle-income families and the second choice of students from middle-high-income families (MoNE, 2007; Ramadhani & Rahayu, 2020). Based on parents' education, highly educated parents tend to choose general schools for their children over vocational schools (Newhouse & Suryadarma, 2011). Based on the 2019 National Socioeconomic Survey, the compo-

sition remained still, in which less than 25% of vocational school students' parents have senior secondary and higher education levels.

The application of TVET to strengthen the connection between school and workplace and ease young workers into the labor market has a contrasting result. Along with the development of technology, workers with a vocational education background might be less adaptable to the labor market demand and face diminished employment later in life (Hanushek, et al., 2011). Korber & Oesch (20 19) found a corresponding result in which the employment prospect of vocational and general education graduates remained the same over the second half of workers' careers. However, after they reach their thirties, vocational graduates earn a substantially lower income than their counterparts from general education, and this income gap is worse among women than men (Korber & Oesch, 2019).

The TVET system has been implemented in several countries with different approaches and results in workers' outcomes and wages. In China, the combination of TVET policies consists of modified curricula to increase youth employability, a modernized vocational education system, and skills-upgrading programs for migrant youth resulting in a significant increase in the youth's labor market outcomes (Tang & Shi, 2017). The implementation of TVET in Brazil generates a different level of wage premiums for graduates from upper secondary level technical schools based on the courses taken and the profile of the graduates (Almeida et al., 2015). However, similar policy implementation in the Philippines generates contrasting evidence where there is no significant difference in wages earned by workers with and without vocational education (Olfindo, 2018).

Several studies discussed the return to vocational and general education had been done in Indonesia. The first research conducted in 2009 found no difference in employment opportunities and/ or earnings premiums between general and vocational secondary school graduates (Chen, 2009). Furthermore, participation in vocational education is related to lower academic achievement, which lowers the possibility of entering college. Based on more recent research using longitudinal data ranging from 1993 to 2007, public vocational secondary schools provided a higher probability of getting a formal job than public general secondary schools for both men and women (Newhouse & Suryadarma, 2011). Although, from the age group analysis, the researchers found a significant drop in the wage premium for the public vocational graduates in the recent age group compared to the older group, especially for men.

Based on our best knowledge, there are a few studies related to the impact of TVET on employment and wage level using updated data and information, especially in developing countries. This research first aims to analyze the context of this problem by applying qualitative and quantitative approaches. And secondly, identify the measures that government should take to enhance the quality of TVET institutions in terms of internal issues related to resource management and external connection with the industry or business environment. The remaining part of this paper will discuss the research method, result, discussion, and conclusion.

METHOD

This study adopted qualitative and quantitative methods using secondary and primary data. The qualitative approach is utilized to learn the context, cause, existing policy, best practices in other countries, and possible recommendations. This paper maximized the triangulation method of data collection, including academic journals, government regulations and information, and mass media, to ensure the author generates proper conclusions and policy recommendations. The author also used stu-

dies from international organizations such as World Bank, OECD, IMF, and ASEAN to complete the perspective related to this issue.

The quantitative analysis in this research will examine the outcome difference in the labor market between vocational and general secondary school graduates using 2019 cross-sectional data. Considering the present policies conducted by the government related to the development of vocational education in Indonesia, this research will answer its impact on the labor market and whether those policies could improve the possibility of youth being employed.

The quantitative analysis focuses on the effects of vocational upper secondary school due to the limited data availability. The quantitative data mainly come from cross-sectional data from National Socioeconomic Survey (SUSENAS) and the National Labor Force Survey (SAKERNAS). The SUSENAS survey is utilized to analyze the impact of TVET on employment, while the SAKERNAS survey is used to examine the impact of TVET on workers' wages. Both surveys were conducted in 2019, before the onset of the COVID-19 pandemic that deteriorated the economic situation in Indonesia and other parts of the world.

In the first step, this research analysis used logit regression to analyze the impact of TVET on employment, as represented in the equation below:

$$Em_i = \gamma_1 tvet_i + u_1 \quad (1)$$

Where Em_i is the categorical variable that represents the employment status of an individual, and $tvet_i$ is the categorical variable that depicts the individual's choice to study in a TVET institution or not. The main observation is the coefficient γ_1 that shows the effect of TVET on the probability of an individual being employed. The hypothesis based on Equation 1 is TVET education has a positive effect on employment.

Furthermore, this paper exploited the ordinary least square (OLS) estimation using the Mincerian wage function to analyze the impact of TVET on wage level, as represented by the equation below:

$$\ln(hour\_wage_i) = \alpha + \beta_1 tvet_i + u_1 \quad (2)$$

This approach has been implemented to analyze the impact of TVET in several countries, such as the Philippines (Olfindo, 2018) and Brazil (Almeida et al., 2015).

This equation calculates the return to education that is represented by β_1. The status of someone taking TVET or not is represented by the variable tvet. The subsequent analysis by specifying $tvet_i$ based on the type of skill (information and communication technology, business management, technology and engineering, others) is performed as well to analyze which type of skill brings better impact on wage. The subpopulation older than the common retired age is eliminated to minimize the outlier in the data analysis. The hypothesis based on Equation 2 is that TVET education has a positive effect on the wage earned by its graduates.

The estimation method combines two approaches: entropy balancing and instrumental variable (IV). The entropy balancing method aims at creating a balanced sample between control and treatment groups by reweighting samples in the control group to match the characteristics of the treatment group based on the similarity of covariate moments (Hainmueller & Xu, 2013). As mentioned in Hainmueller & Xu (2013), the counterfactual mean in the control group may be estimated by

$$\widehat{[Y(0)|D} = 1] = \frac{\sum_{\{i|D=0\}} Y_i w_i}{\sum_{\{i|D=0\}} w_i} \quad (3)$$

Where w_i is the entropy balancing weight chosen for each observation in the control group. This process eliminates the need to perform balance checking between control and treatment groups. Besides that, this method is more

efficient since it retains the information in the control group.

Given the balance condition in the covariates both in the control and treatment groups, the treatment variable tveti in (Eq. 1) and (Eq. 2) can be close to being independent of the background characteristics. So, the coefficient γ_1 and β_1 can represent the impact of joining vocational education on the employment status and level of wage, respectively.

The instrumental variable method minimizes the treatment variable's endogeneity by applying an external variable that is not directly related to the outcome variable (Lal et al., 2021). This is related to the fact that the decision to choose vocational education is not random but related to several factors, such as parent's education, such as parent's income, location, and age, as confounding variables. The percentage share of vocational secondary schools in each province becomes the instrumental variable for the vocational education status. Percentage share of vocational high schools is an exogenous variable that reflects the availability of vocational high schools in each province. The number is diverse in each province, ranging from 28.7% in Maluku to 64.7% in Central Java.

There are two main reasons for choosing the percentage share of vocational secondary schools in each province as an IV. First, provincial governments have the authority to manage the high school in their jurisdiction, including vocational and general high schools (MoEC, 2020b). Their authority is related to distributing human and financial resources, quality assurance, physical infrastructure development, monitoring and evaluation, and other aspects. With this full authority to manage secondary schools, the provincial government is expected to ensure the achievement of K-12 education in their jurisdiction. Second, the availability of vocational high schools in each province influences how the students decide whether they join general or vocational high schools and which field of study they choose. A high number of vocational high schools available in each province might be influenced by several factors, including the demand from industry and society or the importance the authority puts on TVET.

RESULTS AND DISCUSSION

TVET institutions in Indonesia are divided into three levels that consist of vocational higher education (polytechnic and community college), vocational upper secondary school, and nonformal training centers. These colleges, schools, and training centers are managed across ministries. The MoEC manages 33,552 institutions, including vocational upper secondary schools, community colleges, polytechnic, and nonformal community training/ education institutions (World Bank, 2020). The MoM controls 6,438 TVET institutions, including training centers, nonformal course institutions, and community-based training centers. And the Ministry of Religion Affairs (MoRA) currently coordinates one public and private vocational Islamic school and plans to develop two other schools in 2019 (Purnamawati, 2019; MoRA, 2021).

In 2019, at the higher education level, Indonesia had 199 polytechnics, consisting of 43 public institutions (21%) and 156 private institutions (79%). There were 246,282 students in these polytechnics, with 65% of them choosing public institutions (MoEC, 2020b). Indonesia has 18 community colleges with 1,877 students. 2,249 universities also deliver vocational education with 538,841 students. According to the MoEC, polytechnic and community colleges share the same task of providing vocational higher education. Polytechnic offers three or four years of schooling with associate and bachelor's degrees, while community college offers one or two years of associate degrees (MoEC,

2020b). Furthermore, the community college provides field studies related to its specific region's needs to meet the worker demand in that region (MoI, 2021).

Unlike higher education levels, vocational upper secondary schools are managed by the provincial government. Each province has the authority to develop an upper secondary school development plan (MoEC, 2020b, 10). Each province receives allocation funds specifically for vocational secondary school development in their jurisdictions. More than half of vocational upper secondary schools are located on Java Island (57.2%), 20.9% are on Sumatera Island, and the remaining are dispersed in other regions. Compared to the population distribution data, the percentage of vocational upper secondary schools between regions resembles the population share. For example, the share of Indonesia's population in Java and Sumatra is 56.25% and 21.96%, respectively (BPS, 2021).

In 2006, the Indonesian government stipulated a policy to encourage the development of TVET institutions, especially at the upper secondary education level. Based on the Ministry of National Education's Strategic Plan 2005 – 2009, the Government planned to shift the proportion between vocational and general upper secondary education with more focus on vocational secondary education (MoNE, 2007). When the policy was stipulated, the current proportion was 30% for vocational and 70% for general schools. This proportion was targeted to be balanced (50:50) at the end of 2015. And by the end of 2020, the percentage of vocational higher education was to be 60% of the total of secondary educational institutions. This policy froze the construction of new public general upper secondary schools and converted selected general schools to vocational schools (Newhouse & Suryadarma, 2011).

Compared to the realization of the Ministry of National Education's plan in 2006, based on 2019-2020 Education Statistics, the proportion of vocational and general secondary schools was 51: 49, which is close to the target mentioned in the strategic plan (MoEC, 2020a, 2020c). The proportion of vocational and general secondary students was also similar, 52:48. This figure indicates the increasing popularity of TVET institutions in Indonesia.

In 2016, the Indonesian Government released President Instruction 9/2016 about Vocational Upper secondary school Revitalization to Enhance Indonesian Human Resource Quality and Competitiveness. Unlike the policy in 2006 that focused on increasing access to vocational upper secondary schools by increasing its number higher than general ones, this policy focuses on improving the quality of vocational upper secondary graduates.

The President has now required the Ministry of Education and Culture (MoEC), Ministry of Finance (MoF), Ministry of Home Affairs (MoHA), Ministry of Manpower (MoM), Ministry of Industry, and other ministries to strengthen the development of the vocational upper secondary school and enhance the connection between school and industry. The MoEC has several tasks during this revitalization effort, consisting of creating a Vocational School development roadmap, aligning the curriculum to the competencies demanded by the industry, increasing the number and quality of instructors, developing cooperation between related actors, and improving access to certification for graduate and upper secondary school accreditation.

In response to the President's instruction, the MoF issued a tax incentive program named Super Deduction Tax to encourage the private sector to increase their contribution to vocational education in Indonesia. This policy allowed companies to deduct the expenditure to pr-

ovide internships or other programs for vocational education institutions from their gross income (MoF, 2019). This incentive aims to strengthen the connection between the school and workplace environment.

Based on the fourth amendment of the Indonesian constitution in 2002, the Indonesian Government is mandated to allocate 20% of its total budget at a minimum to the education sector. In 2021, the Government will provide IDR 550.005 trillion (USD 38.7 Billion) budget to the educational sector. More than 50% of this budget is transferred to local governments to finance primary and secondary education. 14.82% of this budget is managed by the MoEC, 10.16% is by the MoRA, and 8.6% is by other ministries in the central government. The Indonesian government also allocates 12.07% of its educational budget to the National Education Development Fund (LPDP/ *Lembaga Pengelola Dana Pendidikan*), a public service agency under the MoF that manages endowment funds for education development. In 2021, LPDP started to provide scholarships for vocational education by giving scholarships for project-based and independent study internships for vocational higher education students, including associate and bachelor degrees (MoEC, 2021b).

Indonesia has several funding resources for vocational education. The most significant one comes from the general budget financed by taxes and loans. The government also uses non-tax revenue and sharia retail bond to finance vocational education. Besides the general budget, non-tax revenue, and sharia retail bond, the government granted several vocational higher education institutions (polytechnic and community college) to collect their funding using the Public Service Agency mechanism. A public service agency is one type of government institution in Indonesia that has the flexibility to generate revenue and directly use it. This type of agency has a right to hold its non-revenue tax and directly use it to meet its expenditure. Public service agencies hold business features in their management, allowing the manager to maximize their potential to generate more revenue and use it to improve their performance, focusing on maximizing its benefit to society (MoF, 2021).

The SUSENAS data enabled us to connect parental education and employment status and control these variables in the estimation model. In the entropy balancing method, a set of observable variables, including parent's characteristic (parent's education and employment status) and vector of other observable characteristics (age, residence location (urban/ rural), gender, residence location based on island/ islands (Java/ Bali/ Sumatra/ Kalimantan/ Nusa Tenggara/ Maluku and Papua) is adopted to generate weight in the data sample. The weight constructs a balanced sample between the control and treatment groups by reweighting samples in the control group to match the treatment group's characteristics based on the covariate moments' similarity.

After the sample weight had been defined, a regression based on Eq. 1 was conducted to estimate the impact of vocational upper secondary school on the employment of the graduates. The first estimation applies logit regression with employment status as the dependent variable and participation in vocational education as the independent variable. In the second estimation, the province's share of vocational schools becomes the instrument variable of the treatment status (participation in vocational school). The estimation results are displayed in Table 1.

Table 1. The Impact of Vocational Secondary School on Employment Status

Coverage	Method	
	Entropy Balancing	**Entropy Balancing and Instrumental Variable**
Total Sample	0.1444***	0.4441***
	(0.0045169)	(0.0668006)
Sub Sample - Age		
Below 26	0.1844***	0.1948**
	(0.0052843)	(0.0701474)
26 - 34	0.0250**	0.6116**
	(0.0092468)	(0.1891944)
35 - 45	0.0121	0.5936
	(0.0126826)	(0.3637481)
46 - 55	0.0108	5.8689
	(0.0430274)	(29.64708)

Based on the main estimation results, vocational secondary school has a positive and significant impact on employment status. According to this result, people who graduate from vocational secondary school have a chance to get a job 14.4% higher than others who take general secondary school. The coefficient is significant, with a 99% confidence interval. This percentage is higher than the OECD average, which shows a 10% higher probability of vocational secondary and higher education graduates getting jobs compared to general education (OECD, 2020 a). Compared to the entropy balancing and instrumental variable estimation, the coefficient is also positive and statistically significant. However, the size of the coefficient, 44.4%, is significantly bigger compared to entropy balancing estimation since it shows the LATE (Local Average Treatment Effect) rather than ATE (Average Treatment Effect). This estimation compares people based on their final educational attainment, which means the data does not allow comparing people who graduate from vocational or general secondary school but continue their studies to a higher education level.

Analysis in the age group sub-sample yields various results. The impact of vocational secondary school is positive in people below 26 years old and between 26–34 years old. Vocational secondary school does not positively affect employment in people aged 34 and over. It could be triggered by additional unobservable factors that may influence the relationships between vocational high school and employment status at this level of age, including additional skills or training that someone received during their work experiences.

These results show that vocational school's positive effect is diminished after ten years of graduation. This finding corresponds with Hanushek et al. (2011) findings of the diminishing employment advantage of vocational education graduates. Their research found that graduates from vocational education are more likely to work from an early age, though their employment advantage will reduce over time (Hanushek et al., 2011).

The impact estimation displayed in Table 1 covered the national level. Indonesia is a vast country with more than seventeen thousand islands. Knowing the difference in the impact of vocational education in each area in Indonesia

might help to understand the problem comprehensively. Table 2 shows the detail of this impact based on a different region in Indonesia.

Table 2. The Impact of Vocational Secondary School on Employment Status per Region

Region	Method	
	Entropy Balancing	Entropy Balancing and Instrumental Variable
Java	0.1625***	0.0608
	(0.0069)	(0.0928)
Bali	0.2526***	-
	(0.0248)	
Sumatera	0.1521***	0.5459***
	(0.0081)	(0.0406)
Kalimantan	0.1113***	0.0933
	(0.0155)	(0.0999)
Sulawesi	0.0761***	0.0933
	(0.0560)	(0.0613)
Nusa Tenggara	0.0970***	0.7607***
	(0.0245)	(0.2470)
Maluku and Papua	0.0896***	0.3559
	(0.0234)	(0.3565)

Table 2 shows a positive impact of vocational upper secondary schools on employment status in each area in Indonesia. However, based on the estimation using entropy balancing and instrumental variable method, the positive and significant impact only exist in Sumatera island. This condition may relate to less variability in the instrumental variable. The instrumental variable estimation cannot be applied in Bali since it only has one province, which means there is only one variation.

As abovementioned, there is an almost similar comparison between the percentage share of vocational secondary education and the share of the population across the region in Indonesia. Therefore, we can claim that no area in Indonesia has more privilege to get more proportion of vocational secondary schools.

From the analysis in Table 1 and Table 2, there is a need to provide upskilling and reskilling facilities, especially for people who graduated from vocational secondary education more than ten years after their graduation. The specific treatment for people in this age category is important to maintain their competitiveness in getting a job when they lose their job due to economic cycles or other circumstances.

Similar process is conducted using Equation. 2 to analyze the impact of TVET on wage level. The entropy balancing method is adopted in the preparation process to create a balanced sample between the treatment and control groups. Table 3 represents the estimation results based on the entropy balancing method and the combination between entropy balancing and the instrumental variable method.

Based on the entropy balance method, the full sample analysis shows that vocational

secondary school has a positive but insignificant impact on wage level. It shows that the positive coefficient from this estimation could not be different from zero, meaning that joining the TVET institution does not positively impact the wage level. On the contrary, IV estimation provides a positive and significant effect of joining TVET to wage level. It demonstrates that vocational secondary school graduates get 63% additional wage compared to general secondary school. As mentioned before, IV estimation results in LATE significantly larger than the entropy balancing method. Since there is a difference in both estimations, I argue that there is no causal effect of TVET on wage level.

Table 3 The Impact of Vocational Secondary School on Wage Level

Region	Method	
	Entropy Balancing	**Entropy Balancing and Instrumental Variable**
Total sample	0.0089 (0.0051426)	0.6375*** (0.1387534)
Sub Sample – Age		
Below 26	0.0238** (0.0091191)	1.9773*** (0.2534082)
26 - 34	0.0214* (0,0100082)	0.7028*** (0.2562427)
35 - 45	0.0031 (0.100581)	-0.8180* (0.3175734)
46 - 55	0.0272* (0.012253)	-4.6836 (2.627865)
Sub Sample - Field Study		
Technology and Engineering	0.0337*** (0.0067296)	0.4289* (0.1813589)
Energy and mining	0.0549 (0.0891862)	5.7925 (35.53282)
ICT	0.0046 (0.0156768)	1.0812*** (0.2218886)
Health and social service	0.1332786** (0.0404358)	-4.9016 (6.689822)
Agribusiness and agrotechnology	0.0199 (0.0218789)	-0.9953 (0.5477931)
Maritime	-0.0289 (0.346164)	-45.4703 (615.1819)
Business and management	-0.0144 (0.0087054)	0.5864 (0.3473695)
Tourism	0.0180 (0.016363)	3.1137 (1.829549)
Art and creative industry	-0.0389 (0.0493097)	1.4651 (1.151684)

In the field study subsample, the technology and engineering field has a positive and significant effect on increasing wages. The graduates from technology and engineering field study earn 3% higher wages than the general upper secondary school graduates. Other study fields do not provide a consistent estimation from both estimation methods, so we

can conclude that there is no significant difference in other field studies compared to general secondary school. These results could be affected by the support from the manufacturing industry, such as internship or field training on-site. This situation could also be affected by higher demand from the manufacturing sector for technical and engineering vocational school graduates than in other field studies.

The impact of vocational upper secondary school on wage level varies between regions in Indonesia. Table 4 shows the impact estimation in different regions based on entropy balancing and entropy balancing, and instrumental variable method.

Table 4. The Impact of Vocational Secondary School on Wage Level

Region	Method	
	Entropy Balancing	Entropy Balancing and Instrumental Variable
Java	-0.0185*	-13.12*
	(0.0079)	(5.28)
Bali	0.0014	
	(0.0231)	-
Sumatera	0.0215*	0.0511
	(0.0094)	(0.0585)
Kalimantan	0.0625***	2.135***
	(0.0164)	(7.61)
Sulawesi	0.0078	-0.841***
	(0.0176)	(0.222)
Nusa Tenggara	0.0321	-0.8981*
	(0.0309)	(0.4412)
Maluku and Papua	0.0183	-3.927*
	(0.0228)	(-2.50)

Based on Table 4, the impact of vocational secondary education on wage level varies between regions, consisting of a negative impact in the Java region and a positive impact in other areas. However, the significant result only exists in Java, Sumatra, and Kalimantan regions. The positive and significant impact in the Kalimantan region is consistent, based on entropy balancing and instrumental variable method. On the other hand, the negative and significant result in the Java region is consistent in both estimation methods.

The analysis results in Tables 3 and 4 emphasize the need to strengthen the comparative advantage of vocational school graduates. Vocational secondary school graduates are supposed to be better at generating income since they already get the skill needed to be productive in the workplace. The result shows that this advantage is not realized and tends to be dismissed later in older age. The positive impact on the wage level is realized in a specific region and field of study.

Improving the quality of TVET graduates will directly benefit the private sector. Ideally, TVET provides labor forces that are readily employed by the private sector, so it becomes the rationale to work closely with the private sector to identify the training needs and to ask for more private-sector financial contributions for TVET.

There are two mechanisms to encourage private sector contribution to finance TVET: granting a tax rebate and requiring training levies. A tax rebate acts like a cost reimbursement in which firms can credit their tax with the amount corresponding with the cost to support apprenticeships or training. On the other hand, training levies act as an additional tax that needs to be paid by firms to the government. Training levies have a role like revenue generation schemes where levy proceeds are used to finance training provided by public sector institutions (Ziderman, 2016).

The super deduction tax policy implemented by the Indonesian government follows this concept by giving a rebate of double the cost incurred to support TVET. Based on the implementation in other countries, such as Malaysia, this program is popular among large export-oriented, multinational companies in the electric and electronic sectors (Gonçalves, 2019). This type of firm will train substantially even without this program. Unlike multinational companies, firms with smaller scales and more focus on the domestic market would value the benefit of this program low. Tax rebate schemes focus on funding mechanisms and strengthening the relationship between the school or college environment and the workplace.

The tax rebate policy comes with several challenges such as it can a) impose high administrative and maintenance costs, b) tend to favor routine training instead of new programs, c) deter many enterprises from applying because of bureaucratic requirements and paperwork, and d) delay training within enterprises in some cases because of a slow approval process (Gonçalves, 2019).

Another option to increase private sector funding for TVET is implementing training levies. The other name of this levy is earmarked training levies that are usually levied on the payrolls of enterprises. Levies are usually set at between 1% and 2% of the total wage bills of the enterprise and applied to all firms. This mechanism is implemented in developed and developing countries, including 17 countries in Latin America, Central America, and the Caribbean, 17 countries in Sub-Saharan Africa, 14 countries in Europe, six countries in the Middle East and North Africa, and seven countries in Asia and the Pacific. For example, in Germany, employers contribute three-quarters of the total costs. At the same time, the rest is provided by the Federal Government and the Lander (financing school-based instruction) and by the Federal Employment Services. In this situation, payroll levy schemes may be considered a form of cost-sharing between public and private entities (Ziderman, 2016).

In several countries, tax levy policy is combined with tax rebates in which firms get exempted from tax levies if they contribute to providing direct support for TVET institutions. This policy could increase the participation of firms in contributing more to education and training institutions. However, this policy might need higher administrative and surveillance costs.

Considering these two options to increase the private sector's contribution to funding TVET institutions in Indonesia, tax rebates might seem better than tax levies. The policy not only focuses on the financial perspective but also improves the student's learning experience by encouraging the private sector to provide more internship programs or additional support to the education and training process. The Indonesian government should encourage the private sector to participate more in this tax policy scheme. The tax authority should simplify the verification process in getting the reimbursement. The participation rate of this program is considered low until 2021. By September

2021, there were 429 cooperation agreements between the private sector and TVET institutions, covering 42,015 students (Pratama, 2021). This two-year achievement is considered very low compared to more than 5 million TVET students in Indonesia, including those in secondary and higher education levels.

Developing countries may cooperate with multilateral or bilateral donor institutions to provide funding. The government could consider cooperating with donors regarding a particular project of TVET improvement or a general TVET program. The Indonesian government has experienced receiving donors from USAID through a Global Development Alliance with Chevron and the government of the Aceh province in Indonesia to develop *Politeknik Aceh* (Aring & DePietro-Jurand, 2012). The project was performed from 2007 to 2012. The total budget to develop this project is $12 Million. Chevron and the provincial government funded the physical infrastructure, and USAID funded the technical assistance to develop the curriculum, train and hire staff, and establish linkages with industry and government through a USD 4.9 Million contract with Swisscontact.

A sustainability risk needs to be considered regarding the donor funding mechanism. The government should recognize that donor funding will not continue for the long term, and the continuity of the training effort will need more sustainable funding from other sources. In the case of Politeknik Aceh, after the project ended, the management was shifted to an independent foundation (*Yayasan Politeknik Aceh*) that legally owns the institution and is responsible for oversight. Currently, the main funding resource is student tuition fees allocated to cover operational expenses, including wages and salaries. Other than that, the polytechnic also receives government funds through scholarships link-ed directly to the students as student beneficiaries. Politeknik Aceh also generates funding from the local government, industry, and society (*Politeknik Aceh*, 2018).

To respond to the imbalance between vocational and general higher education, the government should incorporate the private sector to develop more polytechnics. The government could apply a Public-Private Partnership mechanism to share the development burden with the private sector. The Ministry of Industry started this initiative by encouraging several industries to develop related to their industry, even though the ministry did not specify what funding mechanism was used (Ministry of Industry, 2021). The private partner will benefit from the revenue from student tuition fees and the labor supply from polytechnic graduates.

The Indonesian government has issued government bonds to support educational infrastructure development (MoEC, 2021a). The bonds are published under the Sharia rule, a rule that is based on Islamic norms. Under this rule, the proceeds from selling the obligation are intended to develop infrastructure. The return received by the buyer is generated from this investment. In 2021, there were 19 higher educational infrastructure projects funded by sharia obligation, including eight projects in state polytechnics with a total budget of IDR 596.3 billion (USD 41.67 million) (MoEC, 2021a). Considering the majority of the population in Indonesia is Muslim, the Sharia bond has the opportunity to generate more financial resources.

The alternative to this policy is issuing a non-sharia bond specific to TVET infrastructure. The government has not tried this policy since the non-sharia bond's proceeds are included in general funding and dispersed in various expenditures. Earmarking the non-sharia bond proceeds to develop TVET infrastructure might

be feasible. Still, it decreases the flexibility of the money obtained from the proceed and could be ineffective from the perspective of public finance management.

The government could also access foreign borrowing to get more vocational higher education development funding. Currently, the government has several higher education development projects using foreign borrowing, but all of them are intended for general higher education (MoEC, 2021a). The government can open more opportunities for foreign borrowing to develop vocational higher education by working with foreign or multinational companies.

The government could provide scholarships for vocational secondary school to extend their study to polytechnic. The Philippines government applies this type of scholarship and appears to increase the enrolment figure (Gonçalves, 2019). This scholarship focuses on increasing productivity and equity since, as mentioned above, most upper secondary school students come from low-middle-income families. The scholarship could be targeted at a well-performed polytechnic.

LPDP manages the endowment fund for education and currently has two functions: provide scholarships for graduate and doctoral students and financial support for research. The endowment fund managed by LPDP has continuously increased annually since the government provided part of the education budget to LPDP. In 2020, LPDP had USD 304.24 million in net assets (IDR 4.3 trillion), with USD 135.7 million in net revenue (IDR 1.9 trillion) (LPDP, 2021).

The scholarship policy could adopt what LPDP implements in scholarships for graduate and doctoral programs. LPDP has a list of universities that awardees should choose to gain the scholarship. The polytechnic or community college should get good accreditation from the MoEC to get listed in this list. By doing this, the scholarship prog-ram helps vocational upper secondary programs continue their studies and motivates vocational higher education to perform better.

Based on the observation of several schools' and colleges' budget documents, several institutions include the number of students, teachers, infrastructures, curriculum applied, and workshop and lab activities. This format follows the presentational-informed budgeting model, which means the budget relates to future performance.

The existing indicator successfully covers the hard infrastructure and soft infrastructure to facilitate educational activities. However, the indicator should include more performance indicators related to how the graduate used their skill and knowledge from school in the workplace, for example, graduate employment rate. This performance indicator is commonly used in Asian countries, such as the Republic of Korea, Thailand, and Malaysia (Gonçalves, 2019). The government can also adopt tracer studies to capture the quality of TVET graduates in the workplace. Both indicators are already implemented in some vocational higher education, but it has not been adopted in vocational secondary school. The government should consistently implement this indicator at secondary and higher education levels.

The employment rate and tracer study indicator could cover the impact of TVET in different periods. The employment rate covers the short-term impact, while the tracer study shows the long-term impact of TVET. The tracer study is performed by sending a survey to the employer to get their input on the performance of TVET graduates in the workplace. There are two useful results from the tracer study: a quantitative score that can be directly utilized to evaluate the performance and quantitative

input that can be useful to improve the existing academic process.

The challenge the TVET institutions will face in applying this new performance indicator is maintaining the database of their graduates. The implementation in other polytechnic or community colleges will be feasible since this indicator is already implemented in some polytechnics. However, the implementation in vocational secondary schools will be more challenging since schools need to build the database. The government could coordinate this process and conduct the tracer study in the same period across schools across regions. Scaling up this effort lower the implementation cost and increase the coverage of survey respondents.

Another challenge is how to implement the same performance indicators in private institutions. There is a high possibility of pushing vocational upper secondary schools to adopt the same performance indicator since most rely on government funds to support their operation. The government can put a list of performance indicators required to obtain government funding. At the private higher education level, the performance indicators could be included in the accreditation process conducted by the MoEC. This outcome of the accreditation process is the accredited status which represents the quality of the academic process in those institutions, which could be a major point in attracting more students.

In the nonformal training centers, the government could implement a contract-based budget based on the number of participants that join the training programs provided by the government. This policy will attract training centers to attract more students to join their program, and then the centers will get more funding from the government. The number of participants that can be trained should match the existing training center's capacity and historical trade record to ensure they can perform good quality training. The challenge of this recommendation is it needs a reliable registration system that can accommodate participants and training centers in a single platform.

After the TVET institutions implement consistent performance indicators, the government should conduct surveillance regarding the realization of the indicators through performance audits. Performance audit will examine the data reliability regarding input, process, output, and outcome of government entities. The internal auditor in the central and local government could perform this audit. Due to the coverage of the fund also down to private schools, the internal auditor should also include the private school in their audit object. To make the audit process efficient, the auditor could randomly sample the schools to capture their compliance to realize the performance indicator.

The government could implement a reward mechanism for good performers in TVET institutions based on their previous performance adopted in Thailand. The government could consider the whole performance indicators or select several important indicators, such as employment rate and tracer study result, to identify the institution that could accept the reward. The government could also apply criteria that do not directly relate to the performance indicator, such as the support from the private sector received by schools/ polytechnics/ community colleges. The higher support received by these institutions could represent the quality of their learning or training process.

The idea to provide more flexibility to TVET institutions to manage their revenue and expenditure comes from the MoEC (MoEC, 2020b). This idea emphasizes the implementation of financial management schemes in public institutions in Indonesia named Public Service

Agency (BLU/ *Badan Layanan Umum*) and Public Higher Education with Legal Status (PTN-BH/ *Perguruan Tinggi Negeri Berbadan Hukum*) in a public institution. According to the MoEC, the BLU scheme is suitable for secondary and post-secondary TVET institutions, while the PTN-BH scheme is matched for post-secondary institutions. In 2021, the MoEC planned to supervise 65 secondary vocational schools to get Regional Public Service Agency (BLUD/*Badan Layanan Umum Daerah*) as its position under province governments' responsibility. At the post-secondary level, only six polytechnics have already obtained the BLU status among a total of 43 public polytechnics in Indonesia.

The main advantage of getting BLU status is the flexibility to manage revenues and expenses. According to Government Rule No. 23/2005, BLU is an institution in the public sector that provides goods or services to the community without prioritizing profit and managing their operation based on efficiency and productivity principles. BLU has difference feature compared to state-owned enterprises since its asset is recognized as a government asset, and its budget is included in the government budget.

The flexibility in managing revenue means a BLU can directly use its revenue to pay their needs without sending it to a government account first. Unlike regular public entities, BLUs have their cash account that can store their cash and directly use those cash. Regular public entities who generate revenue from society need to transfer the cash revenue to the government bank account, the MoF, before using the cash to pay its expenditure. On the expenditure side, BLUs also have the authority to give additional remuneration for its employee using their revenue. BLUs can procure assets or supplies using their mechanisms, which could be faster than a regular government procurement system. By giving this flexibility, BLU has stronger motivation to generate more revenue and be more efficient in its business operation.

The challenge of this policy is how to improve the entrepreneurship capacity of schools or polytechnic leaders that will adopt BLU. Generating more revenue is mainly related to the leader's entrepreneurship ability to observe revenue opportunities.

PTN-BH brings more flexibility than BLU since it has the same position as a state-owned enterprise in which its assets and budget are not included in the government's balance sheet and budget. Before BLUs shifted to PTN-BH, some requirements needed to be accomplished, including providing quality education based on the MoEC assessment, managing the institution based on the principles of good governance, meeting the minimum standards of financial feasibility, conducting social responsibility, and play a role in economic development. Becoming PTN-BH will benefit the TVET institution and the students since they will receive better service along with the BLU's effort to obtain PTN-BH status.

CONCLUSSION

Youth unemployment has become a major problem in Indonesia since it accounts for more than 20 percent of total unemployment in Indonesia. Considering the increasing economically active population, addressing the youth unemployment problem will benefit Indonesia in the future by increasing the productivity level. TVET becomes one of the avenues to address this problem by giving skills and work experience in the school. It is expected to increase the probability of getting employment after graduation. Based on the quantitative analysis, the existing TVET system in Indonesia has the potential to generate this positive impact since, in upper secondary level education, it

gives a slightly higher employment possibility compared to general education. However, the positive impact is inconsistent and tends to diminish over time.

The Indonesian government should improve by revitalizing the financial mechanism inside these institutions. The fastest way the government can do this is by improving the existing budget allocation by increasing the consistency of performance indicators. This policy is expected to change the behavior of TVET institutions to be more focused on the outcome of improving employability. The government should adopt several options to increase the funding from TVET. Some additional financial resources can be accessed, including the endowment fund, bond issuing, donor funding, direct foreign borrowing, and private sector contributions using public-private partnership or tax contributions.

This research has provided a complete perspective regarding the development of TVET in Indonesia. It covers the impact of the existing system and the measures that government could implement to improve the quality of Indonesian TVET. However, this research is also subject to several limitations. First, the quantitive analysis does not consider people's ability to move around the region to access education and get employed. Second, the quantitative analysis does not cover higher education levels, so there is less evidence to construct the policy recommendations.

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