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Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach

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Abstract

Although the Tomini Bay area has many potential resources, their utilization has not been optimized to benefit the community, the poverty rate in the area is relatively high. On that basis, this study was carried out to assess the contribution of the education sector, which is thought to be capable of improving the quality of human resources and so helping to alleviate poverty. Regression with a dynamic panel data methodology was utilized to cover ten regions over the last ten years (2011–2020). Our findings suggest that public education investment, average years of schooling, high school net enrollment rate, vocational school graduates, and the productivity of uneducated labor in the agricultural sector can help reduce poverty levels in the short and long run. And than, the informal sector's revenue impacts rising poverty rates among high school graduates during the research period, both in the short and long term. Meanwhile, the agricultural sector's contribution variables, such as workers with high school graduates, and the teacher-student ratio in vocational schools, do not affect short or long-term poverty.

Keywords: Education Sector, Poverty and Tomioni Bay.

Introduction

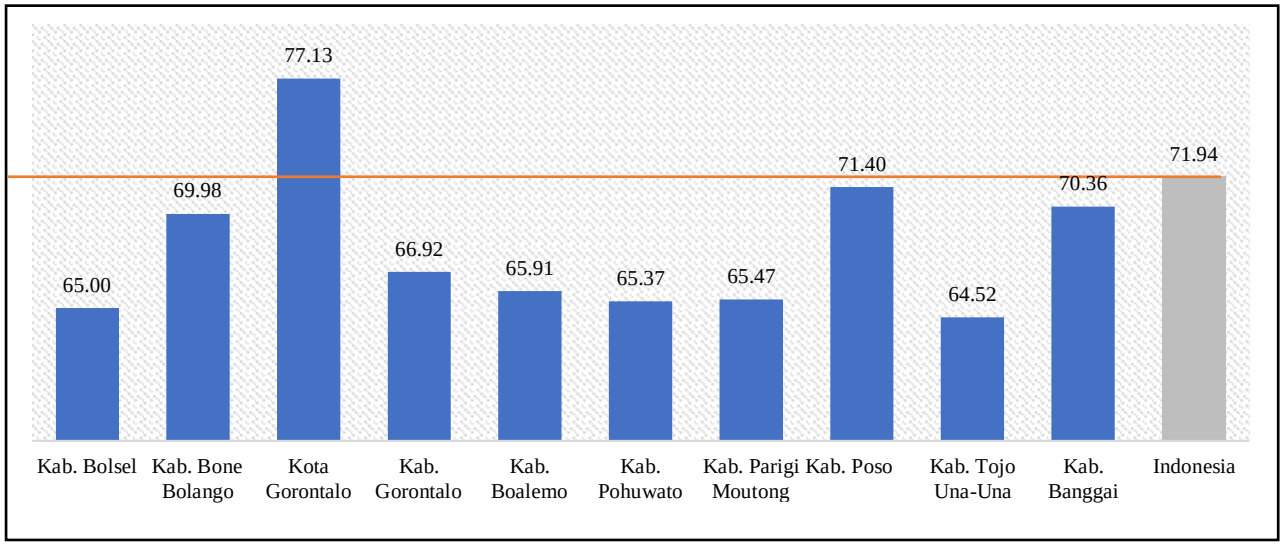
The Tomini Bay area includes a variety of potential natural resources that can be used to boost the region's economic well-being. According to Sachs and Warner (1999) and Gylfason (2007), natural

resources are critical for emerging countries' economic success. However, the Tomini Bay Area's three areas (districts) have high poverty rates. South Bolaang Mongondow Regency in North Sulawesi had 12.77 percent of the population in 2020, Boalemo Gorontalo Regency had 18.57 percent, and Tojo Una-Una Regency in Central Sulawesi had 16.39 percent. North Sulawesi Province, Gorontalo Province, and Central Sulawesi Province have rural poverty rates of 10.25 percent, 14.69 percent, and 23.45 percent, respectively, in the world's largest bay (Central Bureau of Statistics, 2021).

This pattern demonstrates that natural resource potential is not the only element that can boost economic growth (welfare). Other factors, such as human resources and human capital, are required. Human capital is a driving force for economic growth and contributes favorably to economic development, according to Ljungberg and Nilsson (2009), Escosura and Rosés (2010), and Ali et al. (2018). This conclusion, however, differs from Benhabib and Spigel's (1994) findings, which found that human capital did not significantly predict the degree of economic growth. Recent studies have demonstrated, however, that developing skills at all levels of schooling has a major long-term benefit on driving economic growth (Keji, 2021). Furthermore, human capital can simultaneously encourage long-term economic growth and reduce poverty (Olopadea et al., 2019; Chikelu, 2016).

Stakeholders in Indonesia, including the central government and local governments, recognize that human development investment must be prioritized in policymaking through the education sector, so after the reform, the education budget allocation has been set at a minimum of 20% in both the State Revenue and Expenditure Budget (APBN) and the National Revenue and Expenditure Budget. Expenditures in the Regions (APBD). The funding allocation is expected to hasten the improvement of human resource quality. However, this assumption has not been realized to its full potential. The quality of human beings is still uneven between regions, as evaluated by the Human Development Index (HDI). Except for the City of Gorontalo (see graph 1), the HDI in the Tomini Bay Area is still

lower than the national average, despite the fact that each region's HDI has improved, albeit slowly. This situation requires more investigation because human development is prioritized for all regions.



Source: Central Bureau of Statistics, Reanalyzed (2022).

Figure 1: Comparison of HDI Levels in the Tomini Bay Area and National, 2020.

The HDI comprises three components: economy, education, and health. This study focuses on the education sector's performance, which has a relatively high budget allotted each year. The education sector's budget (public expenditure) has a significant long-term impact on poverty reduction (Hidalgo-Hidalgo and Iturbe-Ormaetxe, 2017; Rifa'i and Moddilani, 2021). Aside from that, the supporting components are incredibly diverse, including the contribution of the education sector to economic formation, the Pure Participation Rate (NER) at the high school level, the average length of schooling, high school graduates, vocational high school students, teacher-student ratios for SMA/SMK, and informal sector income levels. The amount of access to education is directly influenced by high school graduates, the working force according to their high school education level, and the agriculture sector's labor productivity. Furthermore, the components supporting the formation of the HDI from the perspective of educational performance want to see their direct impact on poverty by taking samples at the high school or equivalent level, assuming that the higher the level of school participation, the better the quality of human resources (Hermawan and colleagues, 2020).

Apart from establishing that higher access to education can improve human quality, the importance of high school education is studied, as is the efficiency of several local government initiatives that make education free up to the high school level. According to Rolleston (2011) study, increasing educational engagement can lower poverty rates. A greater level of education has relatively more significant benefits in boosting household welfare. Despite the findings of Arham et al. (2021), the poor were not helped by the SMA participation rate. As a result, in addition to examining the degree of access to education and the average length of high school education in this study, it is vital to look at the differences in the effects of graduates from public and vocational schools on poverty. Around the world, there is growing interest in improving vocational education and increasing the number of vocational schools to quickly and successfully integrate young people into the job market by providing them with specialized skills (Hampf and Woessmann, 2017). Meanwhile, because there are more public secondary schools in Indonesia (including the Tomini Bay Area), it is suspected that the profile of public school graduates is unrelated to the availability of job opportunities and the area's potential, which impacts the minimum reduction in poverty. Developing vocational education is a necessity for economic and social development in impoverished areas, according to China's experience (Liu and Chen, 2014).

In the regions, the management of public schools and vocational (vocational) schools is often treated in the same way, primarily when recruiting human resources (teachers). While there is a need for vocational school professors to engage with industry, become network advocates outside of educational institutions, and prepare students to enter the labor (Bouret, 2010) so that they are not unemployed once they complete their studies. Because of the proportional relationship between poverty and unemployment, Mohammad and David (2019) advocate that policymakers construct vocational skills programs to assist in the resolution of unemployment issues. The teacher-student ratio for high school (vocational) students, on the other hand, has to be studied urgently because a large teacher-student ratio is associated with low achievement (Koc and Celik, 2015). Only urban

schools have a low teacher-to-student ratio, whereas rural schools have a high teacher-to-student ratio. This is an external factor that causes student accomplishment in cities to be higher than in rural areas, with the result that the quality of human resources (IPM) in cities is higher, resulting in lower poverty rates indirectly.

Furthermore, because informal sector employees make up the majority of the labor in the Tomini Bay Area, this study looks into the issue of their income after graduating from high school. According to the findings of an empirical study by Timofeyev (2013), the informal sector can help maintain social stability but cannot eliminate poverty. However, the findings of a study by Kar and Marjit (2009) demonstrate the contrary, that informal workers can help alleviate poverty.

Aside from informal sector workers, the number is relatively high due to educational issues that make working in the productive sector less appealing. Because there is a phenomenon where the poverty rate in rural areas is still very high, and those who live in rural areas are farmers, it is critical to analyze the level of labor productivity in the agricultural sector. As a result, it is essential to figure out whether the high percentage of rural poverty in the Tomini Bay area is attributable to low farmer production or something else. The findings of Ogundipe et al. (2016)'s research in Africa demonstrated that agricultural value-added per worker helps alleviate rural poverty.

Departing from the description above, the urgency of this research is carried out by considering three things, 1) The Tomini Bay area has potential natural resources, but the poverty rate is still high, resulting in a paradox, 2) The education sector is a priority program in the region, but at the same time the quality of human resources measured from the HDI level is still low, below the national average, 3) Several empirical studies of variables that support the performance of the education sector show different results so that researchers have the opportunity to conduct further studies. As for the research objectives, including; 1) to find out the impact of public spending by the function of the education sector on poverty, 2) to find out the impact of the education sector's contribution to the economic formation on poverty, 3) to find out the impact of the average length of schooling on

poverty, 4) to find out the impact of the net enrollment rate SMA on poverty, 5) to determine the impact of the labor force based on high school graduates on poverty, 6) to determine the impact of the informal sector income level on poverty, 7) to determine the impact of high school and vocational high school graduates on poverty, 8) to determine the impact of the teacher-student ratio of SMK on poverty, 9) to determine the impact of labor productivity in the agricultural sector on poverty.

Literature Review

Investment in human capital or human development is the key to accelerating economic development and has a higher yield in increasing output (Frank, 1960; Galor and Tsiddon, 1997; Palinescu, 2015). If only relying on natural resource wealth alone, it is proven that many countries fail to be trapped by natural wealth. Natural resources are not a blessing but even a curse (Garelmaa and Kotani, 2016). Several studies show that the abundance of natural resources does not necessarily encourage economic progress (Philippe and Stijns, 2005; Havranek et al., 2016). In that context, investment in human capital needs to be a priority through education. According to Asterioua and Agiomirgianakis (2001), education has a major impact on supporting economic growth, as assessed by primary, secondary, and higher education participation.

The mechanism of economic growth has an impact on reducing poverty, in this case, with a higher rate of economic growth reducing poverty more quickly (Agrawal, 2008). However, inclusive and sustainable economic growth is needed. Pelinescu (2015) argues that inclusive and sustainable economic growth cannot be achieved without the significant contribution of people's skills, knowledge, or values , commonly known as human resources. Therefore, the increase in government spending on human capital investment through the education sector needs to get a more significant portion than other sectors because it has been proven to contribute significantly to poverty alleviation. Hidalgo and Kortajarene (2014) empirical findings show that public spending on education has a substantial long-term effect on reducing poverty. According to Qureshi (2009), higher public

spending on human development improves human quality indicators (HDI) and complements economic growth.

In this regard, the education sector has an impact on human development and contributes to the formation of the economy. Even during the Covid-19 pandemic in Indonesia, the education sector grew positively along with the financial and communication sectors, apart from these sectors experiencing contraction. This phenomenon is in line with the explanation of Liu et al. (2021), where education can lift the country's economic progress, and Mihai et al. (2015) mentions that education is an essential element of poverty reduction and can prevent the next generation from being much poorer. However, the education studied so far is seen from a macro perspective. This study uses several micro indicators, such as the average length of schooling, as a composite of HDI formation. Average Length of Schooling (RLS) is defined as the number of years used by the population informal education (BPS, 2016). RLS can be used to determine the level of community education in an area. Indonesia's RLS is 7.95 years, meaning that, on average, Indonesians aged 25 years and over have studied for 7.95 years or have almost finished class VIII. RLS can be used to determine the quality of community education in an area, meaning that the higher the RLS, the quality of human resources continues to increase. However, when RLS is associated with poverty alleviation in Indonesia, various studies describe different results. For example, the study of Sudaryati et al. (2021) and Sabrina et al. (2021) found that RLS had a negative and significant effect on poverty, while Pradipta and Dewi (2020) concluded the opposite, that there was no effect of RLS on poverty.

Another indicator to support education performance is the Net Enrollment Rate (NER). The population of a certain school age group who is currently attending school at the appropriate level of education (according to the age of the population with the provisions of school age at that level) is defined by the Central Bureau of Statistics as the proportion of the population of that group who is currently attending school at the appropriate level of education. Since 2007, Non-Formal Education (Package A, Package B, Package C) has been considered. The increase in the NER at all school levels

indicates more equity and expansion of access to education. This will then have an impact on reducing poverty. Even though the relationship between NER and poverty still tends to be debated, several research results also show similar symptoms, some have found an impact, and vice versa NER has no impact on poverty reduction (Hikma et al., 2017).

The increase in RLS and NER is expected to increase the labor 's education level to the high school level (SMA) because an improved level of education will make it easier for the labor to find work outside the agricultural sector. Considering that the capacity of the agricultural sector to absorb labor is getting smaller, there is even an accumulation that results in high poverty rates in rural areas. Policymakers so far believe in the general assumption that secondary and higher education is not necessary for economic development, so that the government's attention is more focused on primary education, as evidenced by the nine-year compulsory education program in this case only at the junior high school level being the target for completion. Few local governments program compulsory education up to the high school level; therefore, secondary and higher education are not included in many developing countries and international aid organizations (Tilak, 2007). Even though labor force participation according to higher education levels strongly correlates to poverty improvement, Porreca's (2019) research recommends a poverty alleviation strategy that focuses on human development by increasing labor force education participation.

The assumption is that a higher level of education participation will increase productivity and increase income. Workers in Indonesia have been dominated by workers in the informal sector, which is a person's primary job status which includes self-employment, trying to be assisted by non-permanent workers, trying to be assisted by permanent workers, laborers/employees, freelance workers in agriculture, casual workers in non-agriculture and family workers. /not paid. The Central Statistics Agency (BPS) noted that the number of informal workers reached 78.14 million people in February 2021, increasing 2.64 million people compared to August 2020, which was 77.68 million people. Ideally, the proportion of labor is larger in the formal sector, but in Indonesia, the situation is the

opposite. The informal sector helps many workers so that they are not unemployed, even though many informal workers have insufficient income. According to Timofeyev (2012), the existence of the informal sector can at least maintain social stability but cannot eradicate poverty. A large number of informal sector workers is one of the factors causing the high rate of rural poverty, therefore according to Kathuria and Raj (2015), eradicating poverty requires improving the conditions of workers in the informal sector, which relies on paying minimum wages in addition to providing skills (education).

Another variable supporting educational performance is high school graduates (general and vocational). Educational performance is considered better if the percentage of high school graduates increases. The phenomenon that has been seen so far is that the percentage of school graduates at the higher education level is getting smaller. This means that not all elementary school graduates continue to junior high school, and so on. In contrast, high school graduates, both general and vocational (vocational), have an impact on increasing productivity, which can reduce poverty. Although several studies explain that the impact of general and vocational high school graduates tends to be different, the results, according to Yi et al. (2015), policymakers in many developing countries regard senior secondary technical and vocational education and training as a critical element in economic growth and poverty reduction. In McGrath's view (2012), the existence of vocational education as a means of human development, therefore in the European Union countries (partner countries) have made many efforts to improve the education and vocational training system for human resource development (Wallenborn, 2010). In contrast to the case in Indonesia, vocational schools have many challenges, including being considered a second-class school, the average student input is from low-income families, facilities in vocational schools are still limited, teacher competence is less relevant to the field of learning, this has an impact on the high number of students. Unemployment of vocational school graduates compared to public school graduates.

Therefore, the competence of technical and vocational school teachers is a fundamental factor that can improve the quality of graduates. Beyond that, the teacher-student ratio cannot be ignored.

According to Schwartz et al. (2012), the smaller the ratio of teachers and students will result in a good literacy level with a high level of achievement. On the contrary, literacy performance decreases when the group size (ratio) increases. This means that the teacher-student ratio needs to be given attention so that school graduates at the high school level have good competencies and qualifications. High competence is needed to work in various sectors, including the agricultural sector in general, and they are believed to have high productivity levels. Licona and Székely (2009) explain a strong relationship between macroeconomic stability and poverty, and the underlying factor linking growth to poverty is labor productivity, where labor productivity is most closely linked to poverty. This view is in line with Tath's research (2016) conclusion that increasing labor productivity in the agricultural sector is the key to reducing poverty in rural areas.

Method

Study site and design

The method used in this study is multiple regression with a dynamic panel data approach covering ten regions in the Tomini Bay Area, covering three provinces, namely North Sulawesi, Gorontalo, and Central Sulawesi, for the last ten years (2011 – 2020). The data sources come from the Central Statistics Agency and the Ministry of Finance of the Republic of Indonesia.

Model and statistical analysis

The econometric equation model that was built adopted from the various primary literature, including Liu et al. (2021) and several other supporting kinds of literature, such as Tarabini and Jacovkis (2012) Raffo et al. (2009), then developed several variables as the novelty of this research. The Generalized Method of Moment (GMM) approach uses dynamic panel data regression. There are two estimation methods commonly used in the GMM framework: 1. First-differences GMM (FD-GMM) or Arellano-Bond GMM (AB-GMM), 2. System GMM (SY-GMM). This regression method adds a dependent variable lag to serve as an independent variable because many economic variables are

dynamic. Dynamic is a variable value that influences other variables and relevant variables in the past. In the dynamic panel data regression model, the coefficient β is also a short-term effect of the change in X_{it}. While β/(1-δ) is the long-term effect of changes in X_{it}. The model is structured as follows.

$$Poverty_{it} - Poverty_{it-1} = \delta_0(Poverty_{it-1} - Poverty_{it-2}) + \delta_1(ExpEduc_{it} - ExpEduc_{it-1}) + \delta_2(ShareEduc_{it} - ShareEduc_{it-1}) + \delta_3(MYShool_{it} - MYSchool_{it-1}) + \delta_4(PPRSHS_{it} - PPRSHS_{it-1}) + \delta_5(Labor\ SHS_{it} - Labor\ SHS_{it-1}) + \delta_6(Income_{it} - Income_{it-1}) + \delta_7(HSGraduate_{it} - HSGraduate_{it-1}) + \delta_8(VocGraduate_{it} - VocGraduate_{it-1}) + \delta_9(RatioVoc_{it} - Ratio_{it-1}) + \delta_{10}(ProdTK_{it} - ProdAL_{it-1}) \quad (1)$$

Notes: District/city rural poverty rate (poverty, %), Government expenditure in the district/city education sector (ExpEduc, rupiah), Contribution of the education sector to district/city GRDP (ShareEduc, %), Average length of schooling in district/city City (MYSchool, years), Regency/City High School Net Enrollment Rate (PPRSHS, %), labor by high school education level (LaborSHS, people), Informal Sector Income Level of Regency/Municipal High School graduates (Income, Rupiah), Number of district/city high school graduates (HSGraduate, souls), number of district/city vocational high school graduates (VocGraduate, souls), the teacher-student ratio of district/city vocational high schools (RatioVoc, %) and labor productivity in the agricultural sector with low education (ProdAL, %).

The results of the selection of techniques in dynamic panel data processing have been tested in the form of simultaneous significance testing (Wald test), partial testing (Z test), model specification testing using the Arellano-Bond test (consistency test) and Sargan test (test), instrument validity). A classical assumption test carried out the estimation of Arellano-Bond GMM in dynamic panel data regression. The assumptions that must be met in this research are identical, independent, and normally distributed. In the Arellano-Bond GMM estimation in dynamic panel data regression, the independent

residual is the error resulting from the second-order first difference, autocorrelation occurs. Residual autocorrelation test using Arellano-Bond test. Heteroscedasticity testing on this estimate uses the Sargan test. The result is that there is no problem with the instrument's validity. The normality test on the residuals uses the Shapiro Wilk test.

Results and Discussion

The Tomini Bay area, which surrounds three provinces (North Sulawesi, Gorontalo, and Central Sulawesi), holds various biological potentials, flora, fauna, fisheries and marine, agriculture, minerals, and tourism. Although it has natural resource potential, this area is one of the pockets of poverty in Indonesia, and the quality of human resources is low as measured by HDI. Education is an essential element to accelerate welfare and alleviate poverty. Several factors, including public education spending, must be considered when evaluating the education sector's success. The factors include the contribution of the education sector to the formation of the economy, the average length of schooling, the pure participation rate at the high school level, the labor with high school education, the income of the informal sector workers who graduated from high school, SMA/SMK graduates, teacher-student ratios, and labor productivity in the agricultural sector with low education.

According to Table 1, it is explained that the average of the data analyzed in this study, namely: Public spending on education is 26.14 percent, the contribution of the education sector to the formation of the economy is 0.05 percent, the average length of schooling is 7.6 percent, the net enrollment rate in SMA level is 57.28 percent, labor with high school education is 8.80 percent, income for informal sector workers is high school graduates 14.22 percent, high school graduates are 8.35 percent, SMK graduates are 7.75 percent, the teacher-student ratio is 12.01 percent and labor productivity in the sector low-educated agriculture by 42.38 percent.

Based on the estimation results using the dynamic panel data model with the selected System GMM (SY-GMM) estimation model, the test results (Wald Chi) of all coefficient estimators jointly affect

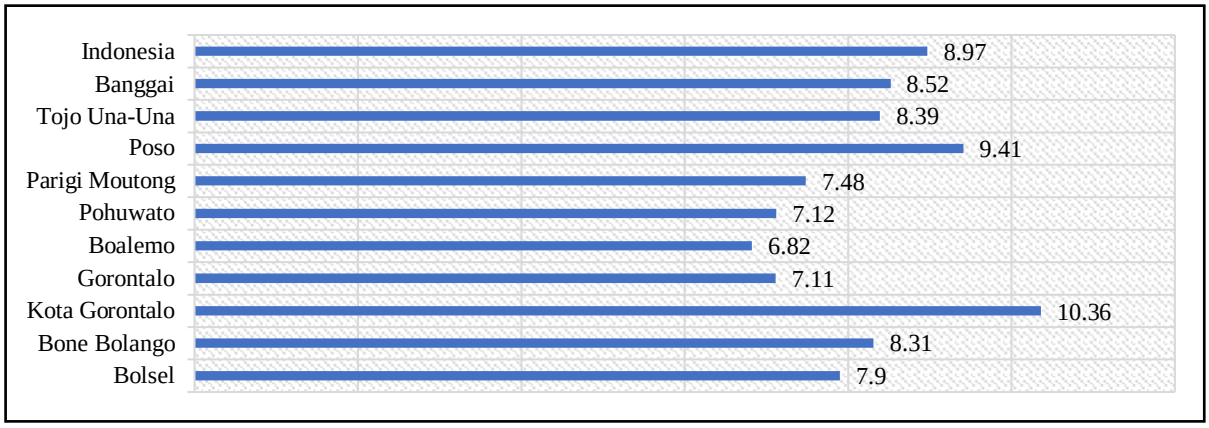
poverty in the Tomini Bay Area. While the partial test results (Z-test) of the 11 coefficient estimators have six significant variables, although the results are not all in line with expectations (theory), the complete estimation results are presented in Table 2.

Based on Table 2, the variable of public expenditure (expenditure) in the education sector by function has a statistically negative effect. This illustrates that if local governments increase public spending on education, it will reduce the poverty rate. In the long term, increasing public spending on education can reduce poverty by 0.09 percent. This finding is in line with previous research conducted by Arimah (2010), Tarabini and Jacovkis (2012), Hidalgo-Hidalgo and Iturbe-Ormaetxe (2018b), Jung and Thorbecke (2003).

The education sector expenditure allocation has the opportunity to continue to be increased every year following the increase in the State budget and local Government budget because the proportion of the budget allocation for the education sector is 20 percent in the State budget/local Government budget, assuming that state revenues also increase, especially from taxes. However, it is necessary to ensure that 20 percent of the allocation for the education sector is used to promote equal improvement in the quality of education. In reality, the inequality of access to education in each region is still vast. As a result, the quality of school graduates from one region to another is different. For provinces with limited facilities, more extensive funding interventions are needed from the central government because most provinces have minimal local government budgets (Arham and Dai, 2019).

It is hoped that the increase in public spending will encourage increased access to education at every level of education, mainly if it is supported by a free education policy so that the average length of schooling continues to increase. Where the variable Average Years of Schooling (MYS) is statistically proven to reduce poverty rates, in the long term, if residents in each region continue to pursue education, the elasticity of poverty reduction will be more excellent. Average Years of Schooling (MYS) as part of the educational performance is still very limited by researchers using it as an estimator; therefore, this finding is a new phenomenon. MYS is a crucial factor to be considered

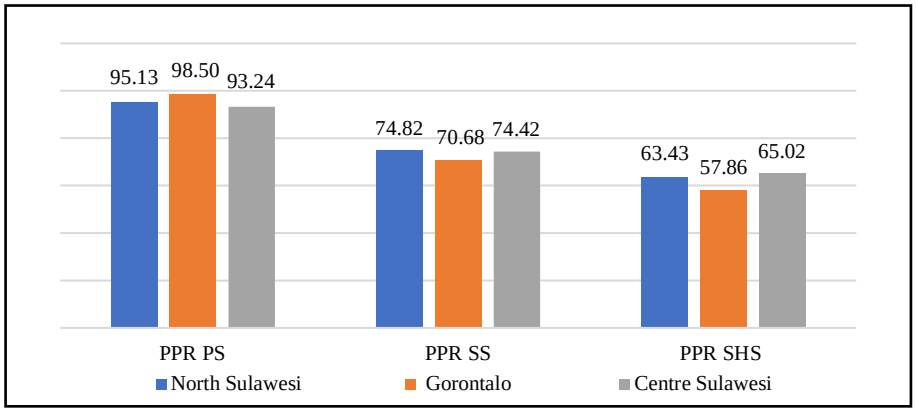
by the government, but in fact, it is still reasonably unequal in the field of MYS in the Tomini Bay Area. In fact, some of the averages are below the national average, as reflected in Figure 2.



Source: Central Bureau of Statistics, data reanalyzed (2022).

Figure 2: Comparison of Average Length of Schooling in Tomini Bay Area and National, 2020.

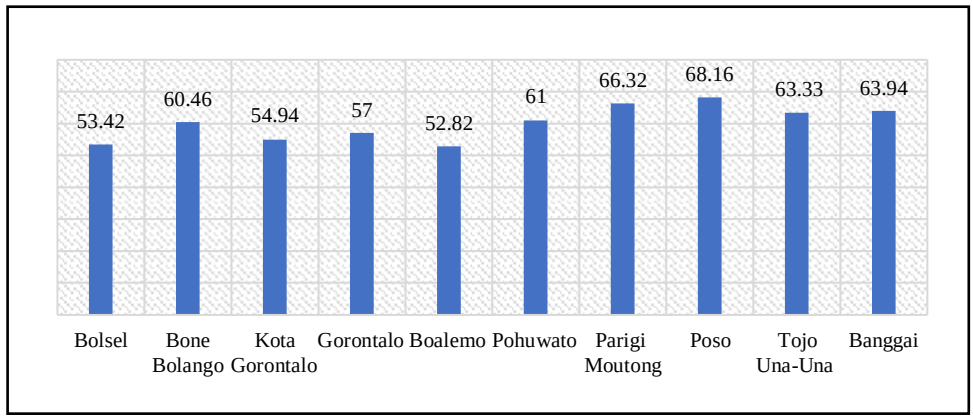
Furthermore, the Pure Participation Rate (NER) at the SMA level is the proportion of the population in a particular education level age group who are still in school to the population in that age group. The estimation results show that the NER has a negative correlation with poverty; with the increase in the NER at the SMA level, the number of poor people has decreased, although the elasticity of the decline in both the short and long term is relatively small. In addition, it can be seen in the research area that the AMP at the high school level tends to decrease compared to the NER at the elementary and junior high school levels (see Figure 3 and 4).



Source: Central Bureau of Statistics, data reanalyzed (2022).

Figure 3: Net Enrollment Rates for Provincial Elementary, Middle and High Schools in the Tomini Bay Area.

The NER at each level of the education unit, apart from decreasing, also tends to experience inequality between regions due to the lack of economic equality. According to Tilak (2018), this condition can disrupt the education system because regions with large economic sizes develop relatively fast human development.



Source: Central Bureau of Statistics, Data reanalyzed (2022).

Figure 4: The NER Gap in the Tomini Bay Area

The more people who continue their education at the high school level, the more their skill abilities will increase, which can be a provision to enter the labor. However, most of them cannot be absorbed in the formal labor market, so they can only be accommodated in the informal sector. The value of the income coefficient for the informal sector for high school graduates shows a positive direction. In this case, it illustrates that if the income of the informal sector for high school graduates increases, it will have an impact on increasing the number of poor people, both in the short and long term. This phenomenon arises because elementary school graduates and below dominate informal sector workers, therefore if the informal sector prioritizes high school graduates to be employed, workers with elementary school graduates and below will be marginalized so that the number of poor people will increase. In other words, when the income of informal workers increases through an increase in wages, the job opportunities for high school graduates and below are increasingly limited because production input costs will increase so that it will not increase the number of workers. According to

Lemos (2004), in order to assist the poor who work in the informal sector, it is necessary to establish a minimum wage, which applies to all workers, not just high school graduates, because an increase in wages, regardless of education level, increases net income, even if it results in the loss of job opportunities for others because there is no increase in labor input as a result of the wage increase.

In the next stage, the estimation results show that the variable of vocational school graduates has a negative effect on poverty, meaning that more graduates of vocational schools will reduce poverty. In the long term, the increase in the number of vocational school graduates will lead to a reduction in the poverty rate by 0.43 percent. This finding reinforces the results of a study conducted by Zhi and Zhao (2021) that vocational education has the highest input-output ratio and is the best way to alleviate poverty.

Furthermore, labor productivity in the agricultural sector should be encouraged because the estimation results show a negative effect. The more productive the labor in the agricultural sector, the number of poor people, will continue to decline, both in the short term and in the long term. The results of this study are not different from previous studies conducted by Abro et al. (2014) in Ethiopia. However, the research results by Adediyan and Omorenuwa (2021) show that labor productivity in the agricultural sector has a short-term effect on reducing poverty.

Conclusions and Suggestions

Based on the results of model estimation and discussion, several important conclusions can be drawn as follows:

1. Public spending on education, both in the short and long term, effectively reduces poverty in the Tomini Bay Area.
2. The average length of schooling has elasticity in reducing the poverty rate, with an increase in the average length of schooling in each region will accelerate the reduction in poverty rates for the short term and long term.

3. The high school enrollment rate will effectively reduce short- and long-term poverty.
4. Vocational school graduates who have the skills and work readiness can reduce poverty in the short and long term.
5. Even with low education, labor productivity in the agricultural sector can reduce the number of poor people short and long term.
6. The level of income in the informal sector for high school graduates impacts increasing poverty rates, both short and long term.

Meanwhile, the contribution variables of the agricultural sector, high school labor, high school graduates, and the teacher-student ratio of vocational schools have no effect at all, both in the short and long term, on poverty in the Tomini Bay area. In that context, several suggestions need to be recommended, including;

1. Public spending on education needs to continue to be increased, but the proportion of financing is more focused on financing supporting facilities and improving learning support in schools,
2. Local governments need to continue to encourage more comprehensive access to education for all levels of society by optimizing the existing budget, including utilizing village funds to help underprivileged communities continue their education in rural areas,
3. High school level enrolment rates need to be optimized by local governments and increase the number of schools throughout the region so that the NER at high school level continues to increase,
4. Vocational schools must be built in accordance with the area economic structure and local potential, as well as curriculum improvements with labor market relevance.
5. Improve agricultural labor productivity by providing skills and information through field school education. Aside from that, structural reforms in the economy must be accelerated so

that labor in the agricultural sector does not accumulate and some labor goes to the formal sector.

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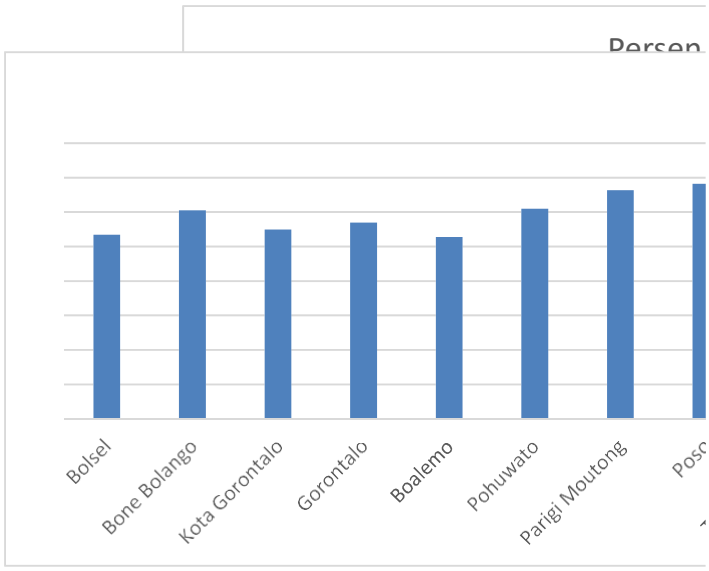
TELUK TOMINI	TAHUN	PROVERTY	KONTRIBUSI		
			PDRBPk	PDRBTotal	SHAREEDUC
BOLSEL	2011	16.57	68.75	795.9	0.086
	2012	15.07	75.278	851.3	0.088
	2013	15.28	78.283	912.7	0.086
	2014	15	84.337	980.9	0.086
	2015	15.17	89.11	1039.4	0.086
	2016	14.85	94.08	1103.1	0.085
	2017	14.16	98.92	1171.96	0.084
	2018	13.6	107.35	1248.8	0.086
	2019	13.27	116.23	1328.57	0.087
	2020	12.77	121.04	1336.97	0.091

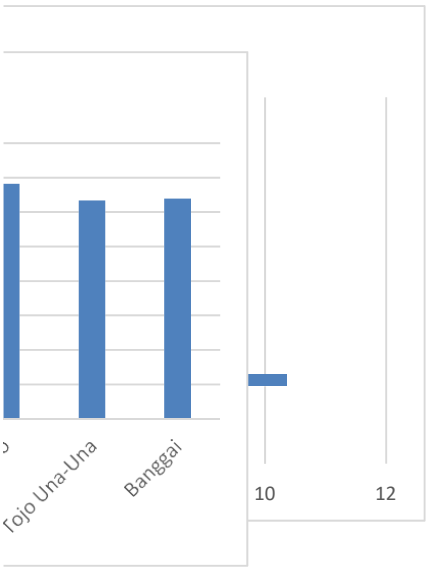
	Persen		APM
Bolsel	7.9	Bolsel	53.42
Bone Bolango	8.31	Bone Bolango	60.46
Kota Gorontalo	10.36	Kota Gorontalo	54.94
Gorontalo	7.11	Gorontalo	57
Boalemo	6.82	Boalemo	52.82
Pohuwato	7.12	Pohuwato	61
Parigi Moutong	7.48	Parigi Moutong	66.32
Poso	9.41	Poso	68.16
Tojo Una-Una	8.39	Tojo Una-Una	63.33
Banggai	8.52	Banggai	63.94
Indonesia	8.97	Indonesia	

	PPR PS	PPR SS	PPR SHS
North Sulawesi	95.13	74.82	63.43
Gorontalo	98.50	70.68	57.86
Centre Sulawesi	93.24	74.42	65.02

EXPEDUC (Miliar Rupiah)	APMSHS	INCOME	LABORSHS	STUNDENT SHS	STUDENTVOC
48,782,948,979	43.04	1050000	3747	702	667
67,638,631,168	43.04	1250000	3369	702	667
64,049,049,195	34.57	1550000	3847	702	667
82,993,341,562	50.44	1900000	3266	938	676
97,642,698,191	50.78	2150000	4318	818	750
107,456,154,248	49.31	2400000	5606	973	804
94,634,003,141	48.44	2598000	6124	1009	785
1,515,387,572	66.77	2824286	6510	927	884
117,562,104,662	53.32	1130337	5758	1193	1034
62,757,558,736	53.42	1143769	7342	1368	1121



RATIO SHS	RATIO VOC	PRODUKTIVITAS TENAGA KERJA			Rata-Rata Lama Skolah
		PDRB	LABOR	PRODTK	
12.54	22.23	337800	11439	29.531	6.87
12.54	22.23	355600	11149	31.895	6.96
12.54	22.23	376000	11149	33.725	7.45
16.17	14.08	391000	11564	33.812	7.68
11.05	9.26	405000	13537	29.918	7.7
16.22	7.88	427200	13537	31.558	7.71
18.95	22.43	451700	11633	38.829	7.72
10.78	11.19	472360	13437	35.154	7.73
13.71	14.16	507700	12226	41.526	7.8
15.37	12.46	517640	12403	41.735	7.9



TELUK TOMINI	TAHUN	PROVERTY	KONTRIBUSI	
			PDRBtPk	PDRBTotal
BONBOL	2011	17.39	75827	1838623
	2012	16.67	89328	1975880
	2013	17.19	101166	2126545
	2014	16.68	110253	2290622
	2015	18.49	118193	2439920
	2016	17.97	124709	2601323
	2017	17.81	129790	2785645
	2018	17.4	141168	2965463
	2019	16.12	154152	3153902
	2020	15.81	161924	3155842
KOTGOR	2011	5.97	158253	5193086
	2012	5.61	172425	5594793
	2013	5.99	192237	6027132
	2014	5.85	218335	6495462
	2015	6.05	233931	6905441
	2016	6.05	245637	7362443
	2017	12.02	263917	7861953
	2018	5.57	286512	8349313
	2019	5.45	310991	8868730
	2020	5.59	323839	8867590
KABGOR	2011	21.31	158253	5193086
	2012	20.79	172425	5594793
	2013	21.57	192237	6027132
	2014	21.05	218335	6495462
	2015	21.8	233931	6905441
	2016	21.03	245637	7362443
	2017	20.55	263917	7861953
	2018	19.84	286512	8349313
	2019	18.06	310991	8868730
	2020	17.56	323839	8867590
BOALEMO	2011	21.9	63569	2060449
	2012	20.42	68919	2213391
	2013	21.79	78254	2378894
	2014	20.79	92343	2552688
	2015	21.67	100286	2715277
	2016	21.11	104392	2886159
	2017	21.85	110928	3078279
	2018	20.33	120770	3284064
	2019	18.87	130480	3504234
	2020	18.57	137192	3496703
POHUWATO	2011	21.58	55789	2715449
	2012	20.18	62543	2919369
	2013	21.47	71737	3143289
	2014	20.69	79520	3372704
	2015	22.43	85198	3577847
	2016	21.17	88394	3815577
	2017	21.27	93560	4074279
	2018	19.4	101101	4338085

	2019	18.16	110070	4610486
	2020	17.62	115947.28	4602268.37

SHAREEDUC	EXPEDUC (Miliyar Rupiah)	APMSHS	INCOME
0.041	107,420,645,547	50.86	762500
0.045	175,627,180,338	48.28	837500
0.048	136,674,553,120	54.2	1175000
0.048	193,391,806,510	64.52	1325000
0.048	190,493,913,676	59.48	1600000
0.048	221,990,510,879	61.01	1875000
0.047	211,908,804,751	59.72	2030000
0.048	197,495,663,834	59.72	1456053
0.049	231,535,578,521	56.69	1568506
0.051	224,663,941,597	60.46	1289503
0.030	186,277,099,240	75.43	762500
0.031	232,921,307,249	56.82	837500
0.032	182,348,713,596	46.16	1175000
0.034	266,463,003,737	66.89	1325000
0.034	268,540,413,360	66.01	1600000
0.033	286,961,973,272	56.4	1875000
0.034	230,372,335,923	57.79	2030000
0.034	376,355,966,573	56.3	2393056
0.035	237,926,411,614	56.69	2164611
0.037	214,953,545,205	54.94	2126398
0.030	330,915,613,843	30.26	762500
0.031	314,393,247,835	46.6	837500
0.032	249,050,744,237	48.99	1175000
0.034	359,558,683,212	61.84	1325000
0.034	397,152,788,894	46.52	1600000
0.033	388,800,781,155	57.37	1875000
0.034	371,965,828,950	56.47	2030000
0.034	181,420,712,260	56.27	1613325
0.035	181,420,712,260	56.93	1602826
0.037	391,657,377,050	57	1164134
0.031	127,245,167,049	36.96	762500
0.031	141,000,324,308	36.96	837500
0.033	111,604,039,789	36.96	1175000
0.036	155,278,723,816	57.02	1325000
0.037	175,589,795,273	49.02	1600000
0.036	21,654,453,397	19.72	1875000
0.036	174,380,293,716	52.31	2030000
0.037	601,642,025,382	52.03	1029649
0.037	199,569,290,812	52.51	1788513
0.039	202,961,323,437	52.82	1706103
0.021	138,705,899,457	46.58	762500
0.021	138,696,915,927	46.58	837500
0.023	132,158,199,877	52.5	1175000
0.024	163,437,561,979	52.5	1325000
0.024	185,760,839,793	69.75	1600000
0.023	183,180,549,415	58.00	1875000
0.023	186,120,754,660	60.00	2030000
0.023	229,469,963,706	61.00	2665684

0.024	212,851,277,619	61.00	1983000
0.025	211,688,313,494	61.00	1879844

LABORSHS	STUNDENT SHS	STUDENTVOC	RATIO SHS	RATIO VOC
100	2083	1517	14	10
1270	2523	2330	13	15
232	2288	1478	14	10
295	3113	2208	15	12
685	3207	2250	13	10
1600	3262	2533	12	11
1435	3391	2598	12	11
11850	3402	2572	14	13
19540	4257	2470	16	11
20848	4180	2475	15	11
403	3 290	1 074	13	6
1390	3 593	1268	13	8
894	3 500	1387	14	8
552	3731	1557	13	9
16598	7598	5745	15	13
16598	4583	5096	15	11
7444	4 583	5145	15	11
38750	4863	6319	24	13
23830	5474	6556	16	12
26812	5439	6729	14	12
6591	5762	2,542	15	11
6591	5067	4237	14	14
6591	8212	4774	22	14
6591	7434	5 784	18	16
41717	8429	5756	22	17
29 307	11844	6800	29	19
36019	8278	5507	16	17
35890	8597	4955	17	13
36258	9203	5189	16	12
37955	9458	5033	16	11
8986	2113	2028	12	10
2191	2505	2244	16	14
1006	2806	2268	11	9
3333	2788	2108	19	11
2470	3 136	2264	23	14
2470	4212	2988	16	12
2824	3165	456	9	7
584	3268	2366	13	9
17975	3900	2379	14	9
16619	4100	2307	14	9
1360	2906	2094	14	10
1360	2795	1992	18	13
1360	3109	1966	21	14
1360	3109	1966	21	14
9362	3348	1806	23	6
9362	3215	1938	27	14
9987	5286	2209	2	9
14471	5526	2035	3	9

16670	5671	2257	3	9
17885	3595	2193	16.42	8.47

PRODUKTIVITAS			rata-rata lama sekolah
PDRBPer	Labor	PDRTK	
672519	28430	23.66	7.23
711344	27250	26.10	7.45
756786	28740	26.33	7.67
809131	31640	25.57	7.7
853566	25160	33.93	7.73
912555	25160	36.27	7.81
981144	29650	33.09	7.84
1039960	19850	52.39	8.04
1094664	17791	61.53	8.07
1085982	18853	57.60	8.31
2030850	36880	55.07	9.77
2200515	36530	60.24	10
2380145	50120	47.49	10:24
2566701	40410	63.52	10.28
2665932	28000	95.21	10.29
2818494	280000	10.07	10.3
3076725	43320	71.02	10.32
3327816	33570	99.13	10.34
358862	25830	13.89	10.35
3548480	46550	76.23	10.36
2030850	56478	35.96	6.19
2200515	58864	37.38	6.25
2380145	53187	44.75	6.31
2566701	67319	38.13	6.53
2665932	61512	43.34	6.63
2818494	65398	43.10	6.64
3076725	65398	47.05	6.81
3327816	58767	56.63	6.83
3587862	58334	61.51	7.11
3548480	65190	54.43	7.13
1171447	33949	34.51	5.91
1242652	42183	29.46	6.01
1312884	42183	31.12	6.12
1378945	42183	32.69	6.15
1441286	42183	34.17	6.23
1522462	42183	36.09	6.3
1626157	36017	45.15	6.38
1742788	34087	51.13	6.53
1881133	38180	49.27	6.54
1854460	37970	48.84	6.82
1588632	42200	37.65	6.17
1704377	42200	40.39	6.26
1826732	39930	45.75	6.53
1954004	39930	48.94	6.54
2048912	29424	69.63	6.62
2183865	29424	74.22	6.67
2354352	26740	88.05	6.84
2519980	28396	88.74	6.85

2670990	30756	86.84	7.1
2633729	29991	87.82	7.12

TELUK TOMINI	TAHUN	PROVERTY	
			PDRBtPk
PARIGI MOUTONG	2011	18.7	219653
	2012	17.36	240214
	2013	17.03	266711
	2014	16.6	288934
	2015	18.05	311313
	2016	17.8	326625
	2017	17.55	347776
	2018	17.41	349499
	2019	16.64	363074
	2020	15.85	356427
POSO	2011	20:10	269473.74
	2012	18:46	287095.69
	2013	18:22	310041.75
	2014	17:09	337425.79
	2015	18:16	359128.37
	2016	17.71	380576.8
	2017	17:16	404179.3
	2018	16.71	428198.28
	2019	15.65	451109.87
	2020	15:45	441400.7
TOUNA	2011	22.37	150347
	2012	20.97	163354
	2013	20.61	178253
	2014	18.95	191160
	2015	18.79	204338
	2016	18.56	210486
	2017	18.15	222062
	2018	18.27	236681
	2019	17.16	241800
	2020	16.39	236020
BANGGAI	2011	11.25	266484
	2012	10.48	312142
	2013	9.81	371594.4
	2014	9.27	440039.3
	2015	9.84	515332.1
	2016	9.47	592927.4
	2017	9.2	403.47
	2018	9.12	420.26
	2019	7.8	438639
	2020	7.39	423.56

KONTRIBUSI		EXPEDUC (Miliyar Rupiah)	APMSHS
PDRBTotal	SHAREEDUC		
7709224	0.028492284	174,232,032,744.75	29.17
8249944	0.02911702	265,593,880,211.35	48.13
8839460	0.030172783	233,055,221,499.34	53.69
9411147	0.030701262	263,640,788,772.46	56.71
10077884	0.030890751	356,819,514,683.50	53.38
10585899	0.030854688	339,819,437,279	64.93
11143766	0.031208148	401,194,476,245	65.23
11424820	0.030591177	357,860,288,547	65.6
11689902	0.031058729	466,427,299,661.00	66.53
11114287	0.032069246	449,010,337,586.00	66.32
3843869.53	0.070104809	178,406,323,567.19	72.99
4134767.59	0.069434541	311,614,289,620.00	72.99
4450517.46	0.069664203	212,018,193,324.04	72.99
4766588.61	0.070789786	338,536,957,615.92	72.99
5106205.89	0.070331745	343,460,993,314.06	61.71
5439503.34	0.069965358	45,456,411,865	65.02
5413903.34	0.074655803	327,497,848,609	63.56
5746974.59	0.074508469	218,045,492,493	63.56
6476302.35	0.069655468	361,622,525,372	68.26
6224308.32	0.070915623	373,725,016,824.00	68.16
2459306	0.06113383	142,187,783,717.00	56.97
2650565	0.061629919	166,330,818,316.05	56.97
2852668	0.062486274	137,707,178,506.10	56.97
3048435	0.062707418	206,259,428,171.75	56.97
3215549	0.063546715	234,269,793,533.54	56.97
3381570	0.062245184	220,498,731,854	56.84
3571753	0.062171587	226,120,000,566	55.58
3706169	0.063861491	433,999,809,025	60.19
3847330	0.062848781	272,101,672,130	61.68
3723860	0.063380471	270,483,543,467.00	63.33
7255857.8	0.03672674	318,513,870,429.86	71.77
8567126.8	0.036434852	383,390,297,329.65	71.77
9942065.3	0.037375977	284,149,306,963.83	71.77
11230557.3	0.039182321	327,546,387,302.15	71.77
15224150.5	0.033849646	417,369,803,340.82	71.77
20900902	0.028368508	466,590,124,426	73.82
7294.28	0.055313204	494,493,805,741	69.89
18360.5	0.022889355	1,243,942,609,942	69.89
19724807	0.022237936	459,108,307,224	63.23
18579.16	0.022797586	426,841,747,811.00	63.94

INCOME	LABORSHS	STUNDENT SHS	STUDENTVOC	RATIO SHS	RATIO VOC
1694228	442	6248	1167	19	8
1694228	1013	6203	1891	29	13
1694228	2066	6781	1974	11	9
1694228	1248	7727	2089	19	9
1694228	33063	8822	1573	13	3
1694228	33063	11217	4184	23	11
1694228	290636	9646	4286	17	13
1694228	40653	9874	4296	17	13
1694228	54477	10609	4252	17	12
1694228	55695	10721	4118	16	11
1498875	1964	5256	2456	18	13
1498875	1964	5251	2123	13	9
1498875	1964	5401	2927	12	9
1498875	70	5035	2123	12	8
1498875	23935	5682	3153	13	9
1498875	23935	5699	3098	19	15
1498875	23044	6082	3850	9	6
1498875	24620	6073	3825	14	10
1498875	32820	6305	3851	14	10
1498875	52203	6588	4221	15	11
1526684	9706	2213	1773	11	10
1526684	10706	2213	1773	11	10
1526684	11706	2523	1865	18	12
1526684	12706	3055	1815	14	10
1526684	9706	5739	432	11	3
1526684	9706	6178	842	16	50
1526684	11749	6401	733	13	7
1526684	14760	3235	2443	17	14
1526684	13559	3311	2556	15	15
1526684	20524	3819	2539	15	13
1598496	2976	7050	2882	15	22
1598496	2326	7554	2346	16	14
1598496	2512	7681	2527	17	12
1598496	1380	8193	2837	15	11
1598496	30379	8857	3753	15	13
1598496	30379	8857	3649	15	13
1598496	30379	8857	3649	15	13
1598496	30379	10 332	5066	14	10
1598496	151105	10985	5130	14	11
1598496	42485	11074	5077	14	10

PRODUKTIVITAS			RATA-RATA LAMA SEKOLAH
PDRBPer	Labor	PDRTK	
3595336	130014	27.65345	6.59
3822066	130014	29.39734	6.64
4038591	130014	31.06274	6.68
4244297	130014	32.64492	6.71
4511468	131124	34.40612	6.72
4761061	131124	36.30961	6.87
4968463	124296	39.97283	6.98
5151380	131932	39.04572	7.18
5304762	124521	42.60134	7.47
5005054	146978	34.05308	7.48
1658361	762	2176.327	8.83
1760276	762	2310.073	8.37
1863682	762	2445.777	8.42
1964172	755	2601.552	8.49
2075817	69690	29.78643	8.52
2147513	69690	30.81522	8.67
2247712	76169	29.50954	8.81
354625	70234	5.049193	9.04
2453469	62578	39.20658	9.36
2429752	63578	38.21687	9.41
974347.6	37205	26.18862	6.89
1039410.3	38205	27.20613	7.06
1108613.1	39205	28.27734	7.23
1178936.2	40205	29.32312	7.62
1239218.3	37205	33.30784	7.65
1284784.92	37205	34.53259	7.87
1359855.52	35709	38.08159	7.9
1375502.42	39162	35.1234	8.16
1434360	40713	35.23101	8.38
1425240	41713	34.16777	8.39
3038788.3	51720	58.75461	7.05
3482806.6	136682	25.48109	7.44
3940092.4	139012	28.34354	7.63
4441746.7	139012	31.95225	7.71
4803418.7	83206	57.72923	7.72
5011768.2	83206	60.23325	7.73
3798890	83206	45.65644	7.92
3907380	83206	46.96032	8.06
4183610	69617	60.09466	8.24
4006.77	83369	0.048061	8.52

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Notifications

[IJEFS] Editor Decision

2022-10-02 07:35 AM

Amir Arham:

We have reached a decision regarding your submission to International Journal of Economics and Finance Studies, "Does Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach: Education and Poverty ".

Our decision is: Revisions Required

Reviewer A and B:

Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach

Abstract

- Remove **;** from title.
- Add recommendations for policy implications.
- Add some relevant keywords.
- Add JEL classification codes.

Introduction

- Try to add just focusing objectives, Add many of the objectives is not a good practice.
- Add some theory point of view which support this study.
- Add structure of the study.

Literature Review

- Add some details of methodology and data analysis technique of previous studies.
- Add novelty of the study.

Methodology

- Add conceptual framework for better understanding of the study.
- Cite previous studies which use the same variables.
- Cite previous studies which use the same data analysis technique.
- Try to add description of data in tabular form which consists of symbol, description, measuring unit, data source and reference.

Results

- Where is the data analysis tables?
- Add tables with their descriptions.

Notifications

[IJEFS] Editor Decision

2022-10-02 07:35 AM

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- Add tables with their descriptions.

Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach

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Abstract

Although the Tomini Bay area has many potential resources, their utilization has not been optimized to benefit the community, the poverty rate in the area is relatively high. On that basis, this study was carried out to assess the contribution of the education sector, which is thought to be capable of improving the quality of human resources and so helping to alleviate poverty. Regression with a dynamic panel data methodology was utilized to cover ten regions over the last ten years (2011–2020). Our findings suggest that public education investment, average years of schooling, high school net enrollment rate, vocational school graduates, and the productivity of uneducated labor in the agricultural sector can help reduce poverty levels in the short and long run. And than, the informal sector's revenue impacts rising poverty rates among high school graduates during the research period, both in the short and long term. Meanwhile, the education sector's contribution variables, such as workers with high school graduates, and the teacher-student ratio in vocational schools, do not affect short or long-term poverty. This study, therefore, provides guidance to policy makers, namely, developing the formal sector (labour-intensive investment) to foster absorption of high school graduates into the workforce through the provision of skills relevant to the world of work.

Keywords: Potential Resources, Performance of Education, Rural Poverty and Tomini Bay.

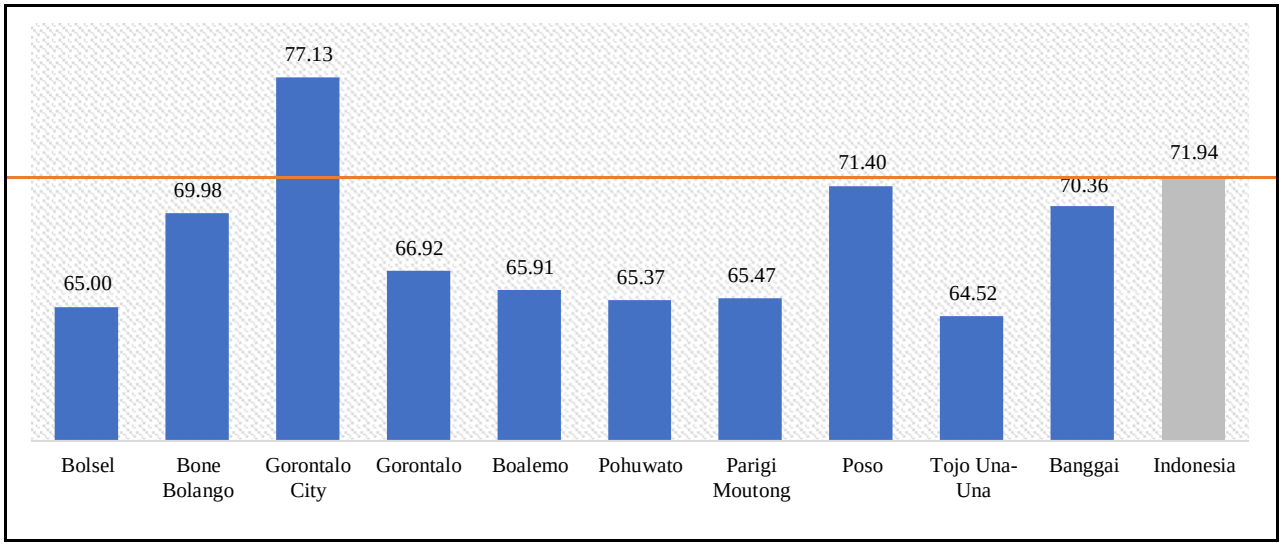
JEL: A20, H75, I121

Introduction

One of the objectives of economic development in a country (region) is to overcome poverty. Based on the experiences of developed and developing countries, poverty can be overcome by optimizing all available resources. Sachs and Warner (1999), as well as Gylfason (2007) argue that natural resources are important catalysts for economic development in under-developed countries. Shah (2009) contends that natural resources have many functions as drivers, the most potential pathways and effective escape mechanisms in overcoming poverty, especially for dominant agrarian countries (regions), such as in Indonesia's Tomini Bay Area. The Tomini Bay area has a variety of potential natural resources that can become the basic capital to improve the economic welfare of it s people. However, the Tomini Bay Area's three areas (districts) have high poverty rates. South Bolaang Mongondow Regency in North Sulawesi had 12.77 percent of the population in 2020, Boalemo Gorontalo Regency had 18.57 percent, and Tojo Una-Una Regency in Central Sulawesi had 16.39 percent. North Sulawesi Province, Gorontalo Province, and Central Sulawesi Province have rural poverty rates of 10.25 percent, 14.69 percent, and 23.45 percent, respectively, in the world's largest bay (Central Bureau of Statistics, 2021).

This pattern demonstrates that natural resource potential is not the only element that can boost economic growth (welfare). Other factors, such as human resources and human capital, are required. Human capital is a driving force for economic growth and contributes favorably to economic development, according to Ljungberg and Nilsson (2009), Escosura and Rosés (2010), and Ali et al. (2018). This conclusion, however, differs from Benhabib and Spigel's (1994) findings, which found that human capital did not significantly predict the degree of economic growth. Recent studies have demonstrated, however, that developing skills at all levels of schooling has a major long-term benefit on driving economic growth (Keji, 2021). Furthermore, human capital can simultaneously encourage long-term economic growth and reduce poverty (Olopadea et al., 2019; Chikelu, 2016).

Stakeholders in Indonesia, including the central government and local governments, recognize that human development investment must be prioritized in policymaking through the education sector, so after the reform, the education budget allocation has been set at a minimum of 20% in both the State Revenue and Expenditure Budget (APBN) and the National Revenue and Expenditure Budget. Expenditures in the Regions (APBD). The funding allocation is expected to hasten the improvement of human resource quality. However, this assumption has not been realized to its full potential. The quality of human beings is still uneven between regions, as evaluated by the Human Development Index (HDI). Except for the City of Gorontalo (see graph 1), the HDI in the Tomini Bay Area is still lower than the national average, despite the fact that each region's HDI has improved, albeit slowly. This situation requires more investigation because human development is prioritized for all regions.



Source: Central Bureau of Statistics, Reanalyzed (2022).

Figure 1: Comparison of HDI Levels in the Tomini Bay Area and National, 2020.

The HDI comprises three components: economy, education, and health. This study focuses on the education sector's performance, which has a relatively high budget allotted each year. The education sector's budget (public expenditure) has a significant long-term impact on poverty reduction (Hidalgo-Hidalgo and Iturbe-Ormaetxe, 2017; Rifa'i and Moddilani, 2021). Aside from that, the supporting components are incredibly diverse, including the contribution of the education sector to

economic formation, the Pure Participation Rate (NER) at the high school level, the average length of schooling, high school graduates, vocational high school students, teacher-student ratios for SMA/SMK, and informal sector income levels. The amount of access to education is directly influenced by high school graduates, the working force according to their high school education level, and the agriculture sector's labor productivity. Furthermore, the components supporting the formation of the HDI from the perspective of educational performance want to see their direct impact on poverty by taking samples at the high school or equivalent level, assuming that the higher the level of school participation, the better the quality of human resources (Hermawan and colleagues, 2020).

Apart from establishing that higher access to education can improve human quality, the importance of high school education is studied, as is the efficiency of several local government initiatives that make education free up to the high school level. According to Rolleston (2011) study, increasing educational engagement can lower poverty rates. A greater level of education has relatively more significant benefits in boosting household welfare. Despite the findings of Arham et al. (2021), the poor were not helped by the SMA participation rate. As a result, in addition to examining the degree of access to education and the average length of high school education in this study, it is vital to look at the differences in the effects of graduates from public and vocational schools on poverty.

Around the world, there is growing interest in improving vocational education and increasing the number of vocational schools to quickly and successfully integrate young people into the job market by providing them with specialized skills (Hampf and Woessmann, 2017). Meanwhile, because there are more public secondary schools in Indonesia (including the Tomini Bay Area), it is suspected that the profile of public school graduates is unrelated to the availability of job opportunities and the area's potential, which impacts the minimum reduction in poverty. Developing vocational education is a necessity for economic and social development in impoverished areas, according to China's experience (Liu and Chen, 2014).

In the regions, the management of public schools and vocational (vocational) schools is often treated in the same way, primarily when recruiting human resources (teachers). While there is a need for vocational school professors to engage with industry, become network advocates outside of educational institutions, and prepare students to enter the labor (Bouret, 2010) so that they are not unemployed once they complete their studies. Because of the proportional relationship between poverty and unemployment, Mohammad and David (2019) advocate that policymakers construct vocational skills programs to assist in the resolution of unemployment issues. The teacher-student ratio for high school (vocational) students, on the other hand, has to be studied urgently because a large teacher-student ratio is associated with low achievement (Koc and Celik, 2015). Only urban schools have a low teacher-to-student ratio, whereas rural schools have a high teacher-to-student ratio. This is an external factor that causes student accomplishment in cities to be higher than in rural areas, with the result that the quality of human resources (IPM) in cities is higher, resulting in lower poverty rates indirectly.

Furthermore, because informal sector employees make up the majority of the labor in the Tomini Bay Area, this study looks into the issue of their income after graduating from high school. According to the findings of an empirical study by Timofeyev (2013), the informal sector can help maintain social stability but cannot eliminate poverty. However, the findings of a study by Kar and Marjit (2009) demonstrate the contrary, that informal workers can help alleviate poverty.

Aside from informal sector workers, the number is relatively high due to educational issues that make working in the productive sector less appealing. Because there is a phenomenon where the poverty rate in rural areas is still very high, and those who live in rural areas are farmers, it is critical to analyze the level of labor productivity in the agricultural sector. As a result, it is essential to figure out whether the high percentage of rural poverty in the Tomini Bay area is attributable to low farmer production or something else. The findings of Ogundipe et al. (2016)'s research in Africa demonstrated that agricultural value-added per worker helps alleviate rural poverty.

Departing from the description above, the urgency of this research is carried out by considering three things, 1) The Tomini Bay area has potential natural resources, but the poverty rate is still high, resulting in a paradox, 2) The education sector is a priority program in the region, but at the same time the quality of human resources measured from the HDI level is still low, below the national average, 3) Several empirical studies of variables that support the performance of the education sector show different results so that researchers have the opportunity to conduct further studies. The aim of this present studiy, therefore, is to determine the performance impact of the education sector on poverty reduction in the Tomini Bay Region, Indonesia, which is rich in natural resources.

The study reported in this paper is organised as follows. The first part introduces the background, significance and purpose of the study. The second part presents theoretical studies regarding the performance of the education sector and poverty, as well as a review of previous studies. The third section outlines the method, conceptual framework and data collection. The fourth section presents the results obtained using dynamic panel data, and the last section provides the research conclusions and policy recommendations.

Literature Review

Investment in human capital or human development is the key to accelerating economic development and has a higher yield in increasing output (Frank, 1960; Galor and Tsiddon, 1997; Palinescu, 2015). If only relying on natural resource wealth alone, it is proven that many countries fail to be trapped by natural wealth. Natural resources are not a blessing but even a curse (Garelmaa and Kotani, 2016). Several studies show that the abundance of natural resources does not necessarily encourage economic progress (Philippe and Stijns, 2005; Havranek et al., 2016). In that context, investment in human capital needs to be a priority through education. According to Asterioua and Agiomirgianakis (2001), education has a major impact on supporting economic growth, as assessed by primary, secondary, and higher education participation.

The mechanism of economic growth has an impact on reducing poverty, in this case, with a higher rate of economic growth reducing poverty more quickly (Agrawal, 2008). However, inclusive and sustainable economic growth is needed. Pelinescu (2015) argues that inclusive and sustainable economic growth cannot be achieved without the significant contribution of people's skills, knowledge, or values , commonly known as human resources. Therefore, the increase in government spending on human capital investment through the education sector needs to get a more significant portion than other sectors because it has been proven to contribute significantly to poverty alleviation. This theoretical explanation is empirically proven by Hidalgo and Kortajarene (2014). In their study, they used time series regression analysis over the period 2005 – 2011, by adding a dummy variable, namely comparing the expenditure of less educated and educated families. The results showed that public spending on education had a strong long-term effect on reducing poverty, and families with less education were more likely to remain poor. According to Qureshi (2009), higher public spending on human development improves human quality indicators (HDI) and complements economic growth.

In this regard, the education sector has an impact on human development and contributes to the formation of the economy. Even during the Covid-19 pandemic in Indonesia, the education sector grew positively along with the financial and communication sectors, apart from these sectors experiencing contraction. Therefore, the education sector has the resilience to face crises, an impact on economic improvement, and at the same time help overcome poverty. Liu, et. al. (2021) conducted a study which measured the role of education in poverty alleviation. The model was estimated using time series data from 1980 to 2018, using the Engle-Granger two-step cointegration technique, to obtain long-term and short-term economic dynamic characteristics of education to reduce poverty in the current era. The results revealed that education significantly reduced poverty rates, while the role of higher education appeared to be more significant for poverty alleviation. And Mihai et al. (2015)

mentions that education is an essential element of poverty reduction and can prevent the next generation from being much poorer.

However, the education studied so far is seen from a macro perspective. This study uses several micro indicators, such as the average length of schooling, as a composite of HDI formation. Average Length of Schooling (RLS) is defined as the number of years used by the population informal education (BPS, 2016). RLS can be used to determine the level of community education in an area. Indonesia's RLS is 7.95 years, meaning that, on average, Indonesians aged 25 years and over have studied for 7.95 years or have almost finished class VIII. RLS can be used to determine the quality of community education in an area, meaning that the higher the RLS, the quality of human resources continues to increase. However, when RLS is associated with poverty alleviation in Indonesia, various studies describe different results. For example, the study by Sudaryati et al. (2021) which used the multiple linear regression analysis method with the Ordinary Least Square (OLS) approach from 2005 – 2019. The results indicated that the average length of schooling had a negative and significant effect on reducing the poverty rate. This finding is in line with the study by Sabrina et. al., (2021). Meanwhile, the study by Pradipta and Dewi (2020) which employed an associative quantitative research and analytical techniques in the form of panel data analysis with a fixed effect model, concluded that there was no effect of RLS on poverty.

Another indicator to support education performance is the Net Enrollment Rate (NER). The population of a certain school age group who is currently attending school at the appropriate level of education (according to the age of the population with the provisions of school age at that level) is defined by the Central Bureau of Statistics as the proportion of the population of that group who is currently attending school at the appropriate level of education. Since 2007, Non-Formal Education (Package A, Package B, Package C) has been considered. The increase in the NER at all school levels indicates more equity and expansion of access to education. This will then have an impact on reducing poverty. Even though the relationship between APM and poverty remains debatable, several research

results show that an increase in APM has an impact on poverty, but a study by Hikma, et. al. (2017) which used the multiple linear regression method from 2008 to 2017 concluded that the increase in the APM had no significant impact on reducing the poverty rate.

The increase in RLS and NER is expected to increase the labor 's education level to the high school level (SMA) because an improved level of education will make it easier for the labor to find work outside the agricultural sector. Considering that the capacity of the agricultural sector to absorb labor is getting smaller, there is even an accumulation that results in high poverty rates in rural areas. Policymakers so far believe in the general assumption that secondary and higher education is not necessary for economic development, so that the government's attention is more focused on primary education, as evidenced by the nine-year compulsory education program in this case only at the junior high school level being the target for completion. Few local governments program compulsory education up to the high school level; therefore, secondary and higher education are not included in many developing countries and international aid organizations (Tilak, 2007). Even though labor force participation according to higher education levels strongly correlates to poverty improvement, Porreca's (2019) research recommends a poverty alleviation strategy that focuses on human development by increasing labor force education participation.

The assumption is that a higher level of education participation will increase productivity and increase income. Workers in Indonesia have been dominated by workers in the informal sector, which is a person's primary job status which includes self-employment, trying to be assisted by non-permanent workers, trying to be assisted by permanent workers, laborers/employees, freelance workers in agriculture, casual workers in non-agriculture and family workers. /not paid. The Central Statistics Agency (BPS) noted that the number of informal workers reached 78.14 million people in February 2021, increasing 2.64 million people compared to August 2020, which was 77.68 million people. Ideally, the proportion of labor is larger in the formal sector, but in Indonesia, the situation is the opposite. The informal sector helps many workers so that they are not unemployed, even though many

informal workers have insufficient income. According to Timofeyev (2012), the existence of the informal sector can at least maintain social stability but cannot eradicate poverty. A large number of informal sector workers is one of the factors causing the high rate of rural poverty, therefore according to Kathuria and Raj (2015), eradicating poverty requires improving the conditions of workers in the informal sector, which relies on paying minimum wages in addition to providing skills. Based on this theoretical explanation, the focus is more on strengthening the formal sector (real sector) in economic development and improving the level of income of informal workers to reduce poverty rates. This paper attempts to fill the gap in the literature by linking the level of education (high school graduates) of informal sector workers with poverty in the Tomini Bay Region of Indonesia.

Another variable supporting educational performance is high school graduates (general and vocational). Educational performance is considered better if the percentage of high school graduates increases. The phenomenon that has been seen so far is that the percentage of school graduates at the higher education level is getting smaller. This means that not all elementary school graduates continue to junior high school, and so on. In contrast, high school graduates, both general and vocational (vocational), have an impact on increasing productivity, which can reduce poverty. Although several studies explain that the impact of general and vocational high school graduates tends to be different, the results, Zhi and Zhao (2021) conducted a study of 1,280 poor households in the poor areas of Longsheng County and Ziyuan County in China's Guangxi Zhuang Autonomous Region. The results show the long-term effects of poverty alleviation through vocational education, especially vocational education in rural areas. According to Yi et al. (2015), policymakers in many developing countries regard senior secondary technical and vocational education and training as a critical element in economic growth and poverty reduction. In McGrath's view (2012), the existence of vocational education as a means of human development, therefore in the European Union countries (partner countries) have made many efforts to improve the education and vocational training system for human resource development (Wallenborn, 2010). In contrast to the case in Indonesia, vocational schools

have many challenges, including being considered a second-class school, the average student input is from low-income families, facilities in vocational schools are still limited, teacher competence is less relevant to the field of learning, this has an impact on the high number of students. Unemployment of vocational school graduates compared to public school graduates.

Therefore, the competence of technical and vocational school teachers is a fundamental factor that can improve the quality of graduates. Beyond that, the teacher-student ratio cannot be ignored. According to Schwartz et al. (2012), the smaller the ratio of teachers and students will result in a good literacy level with a high level of achievement. On the contrary, literacy performance decreases when the group size (ratio) increases. This means that the teacher-student ratio needs to be given attention so that school graduates at the high school level have good competencies and qualifications. As a result, further research into the influence of teacher-student ratios in vocational schools on enhancing student achievement and producing competent graduates is necessary. The expectation is that graduates of vocational schools would be able to find work right away, because the open unemployment rate among vocational school graduates is now the highest. The high number of educated unemployed will certainly have an impact on poverty. The variable teacher-pupil ratio of vocational schools is a novelty of this paper, which will fill in the gaps in the literature. Although the teacher-student ratio plays a significant role in raising accomplishment to generate graduates with high competence, research has thus far concentrated on teacher quality, and teaching methods are thought to have a greater influence on boosting student achievement.

High competence is needed to work in various sectors, including the agricultural sector in general, and they are believed to have high productivity levels. Licona and Székely (2009) explain a strong relationship between macroeconomic stability and poverty, and the underlying factor linking growth to poverty is labor productivity, where labor productivity is most closely linked to poverty. This opinion is consistent with Tath's (2016) research, which used information from the 2009 Cambodian Socio-Economic Survey (CSES). In this study, the effects of labor productivity and land productivity

on household poverty among rice-farming households in Cambodia are investigated. The conclusion is that the key to alleviating poverty in rural regions is to increase labor productivity in the agriculture industry.

Despite the fact that the connection between educational achievement and poverty has been extensively discussed in the literature, there are still many unanswered questions. Therefore, more research is required to explore the dynamic relationship between educational achievement and poverty, particularly for the economic area, which is dominated by the agriculture sector and has other potential natural resources. This study, therefore, was carried out to fill a gap in the literature by using educational performance as measured by education sector financing, education sector contribution to economic formation, average length of schooling, Net Erollment Rate (NER) level at senior high school level, work force of high school graduates, high school and vocational high school graduates, and labor productivity in the agricultural sector with low education as the main variables. Meanwhile, the income level of informal sector workers who graduated from high school and the teacher-student ratio of vocational schools are additional variables as well as updates from previous research.

Method

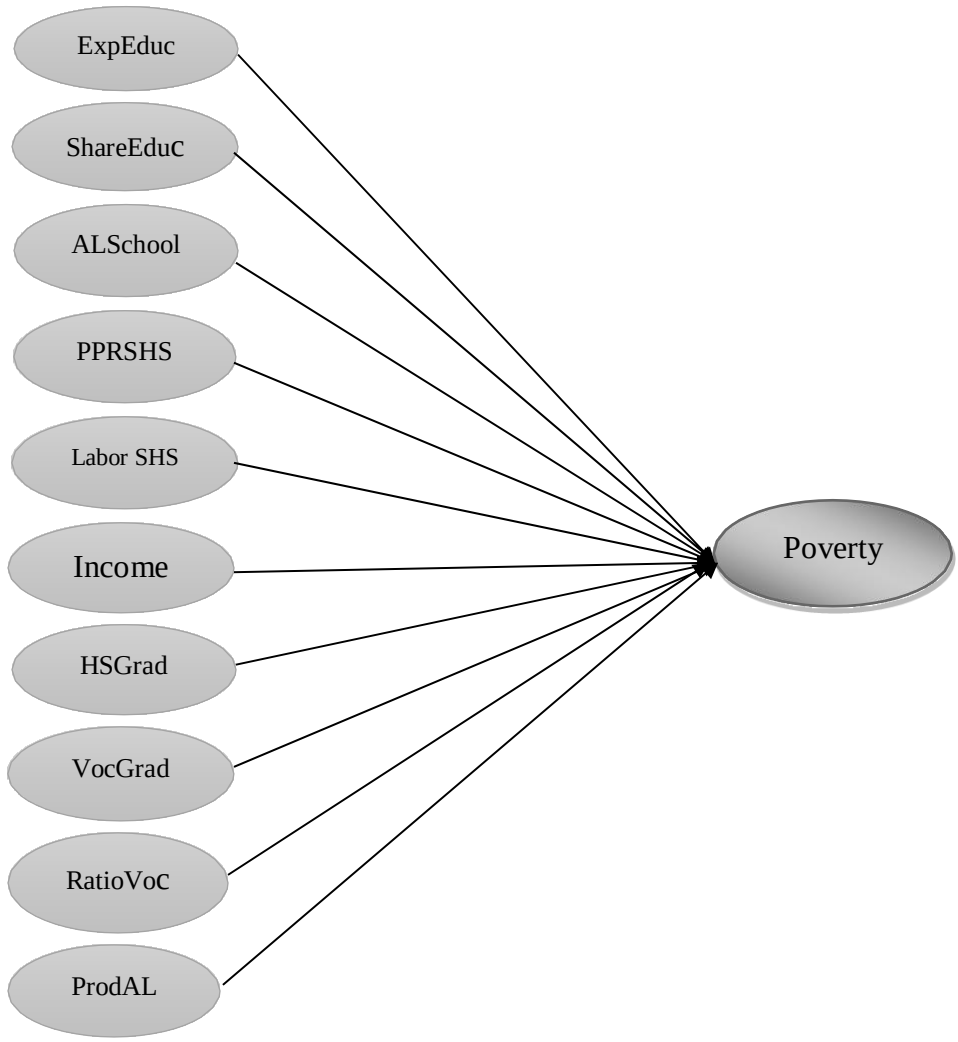
Study site and design

The method used in this study is multiple regression with a dynamic panel data approach covering ten regions in the Tomini Bay Area, covering three provinces, namely North Sulawesi, Gorontalo, and Central Sulawesi, for the last ten years (2011 – 2020). The Generalized Method of Moment (GMM) approach uses dynamic panel data regression. There are two estimation methods commonly used in the GMM framework: 1. First-differences GMM (FD-GMM) or Arellano-Bond GMM (AB-GMM), 2. System GMM (SY-GMM). This regression method adds a dependent variable lag to serve as an independent variable because many economic variables are dynamic. Dynamic is a variable value that influences other variables and relevant variables in the past. In the dynamic panel data

regression model, the coefficient β is also a short-term effect of the change in X_{it}. While β/(1-δ) is the long-term effect of changes in X_{it}. The data sources come from the Central Statistics Agency and the Ministry of Finance of the Republic of Indonesia.

Model and statistical analysis

The econometric equation model that was built adopted from the various primary literature, including Liu et al. (2021) and several other supporting kinds of literature, such as Tarabini and Jacovkis (2012) Raffo et al. (2009), then developed several variables as the novelty of this research. In order to facilitate understanding of the relationship between variables in this study, the conceptual framework of the research is shown below.



From this conceptual framework, an econometric model is developed as follows.

$$Poverty_{it} = \gamma_0 + \gamma_1 ExpEduc_{it} + \gamma_2 ShareEduc_{it} + \gamma_3 MySchool_{it} + \gamma_4 PPRSHS_{it} + \gamma_5 LborSHS_{it} + \gamma_6 Income_{it} + \gamma_7 HSGraduate_{it} + \gamma_8 VocGraduate_{it} + \gamma_9 RatioVoca_{it} + \gamma_{10} ProdAL_{it} + \varepsilon \quad (1)$$

The equation model above is then derived into a dynamic data panel model, as displayed below.

$$Poverty_{it} - Poverty_{it-1} = \delta_0(Poverty_{it-1} - Poverty_{it-2}) + \delta_1(ExpEduc_{it} - ExpEduc_{it-1}) + \delta_2(ShareEduc_{it} - ShareEduc_{it-1}) + \delta_3(ALShool_{it} - ALSchool_{it-1}) + \delta_4(PPRSHS_{it} - PPRSHS_{it-1}) + \delta_5(Labor\ SHS_{it} - Labor\ SHS_{it-1}) + \delta_6(Income_{it} - Income_{it-1}) + \delta_7(HSGraduate_{it} - HSGraduate_{it-1}) + \delta_8(VocGraduate_{it} - VocGraduate_{it-1}) + \delta_9(RatioVoc_{it} - Ratio_{it-1}) + \delta_{10}(ProdTK_{it} - ProdAL_{it-1}) \quad (2)$$

Notes:

$Poverty$ = Rural poverty rate

$ExpEduc$ = Government expenditure in education sector

$ShareEduc$ = Contribution of the education sector to district/city GRDP

$ALSchool$ = Average length of schooling

$PPRSHS$ = Pure High School Net Enrollment Rate

$LaborSHS$ = Labor by high school education level

$Income$ = Informal Sector Income Level of high school graduates

$HSGraduate$ = Number of high school graduates

$VocGraduate$ = Number of Vocational graduates

$RatioVoc$ = The teacher-student ratio of vocational high schools

$ProdAL$ = Labor productivity in the agricultural sector with low education

The construction, measurement and data sources of the model can be seen in table 1.

Tabel 1: A description of research variables

Variable	Measurement	Refereence
$Poverty$	Percentage (P0) of the district/city rural poverty level in the Tomini Bay Area.	Central Bureau of Statistics
$ExpEduc$	The amount of local government spending in the education sector, in rupiah (Sasana and Kusuma, 2018).	Central Bureau of Statistics
$ShareEduc$	Percentage of business field contribution in the education sector on the economic formation (Cloud, et. al, 2011).	Central Bureau of Statistics
$ALSchool$	Years of Average Length of Study of Regency/City Residents in the Tomini Bay Area (Sudaryati, 2021)	Central Bureau of Statistics
$PPRSHS$	Percentage of Senior High School Net Enrollment Rate (Hikma, et. al, 2017)	Central Bureau of Statistics
$LaborSHS$	Percentage of labor force employed, by level of high school education (Adapted from Porreca theory, 2019)	Central Bureau of Statistics
$Income$	Informal Sector Income at the district/city level by high school graduates (measured in rupiah)	Central Bureau of Statistics
$HSGraduate$	Percentage of high school graduates from the district/city in the Tomini Bay Area	Central Bureau of Statistics
$VocGraduate$	Percentage of vocational school graduates in the districts/cities (Zhi and Zhao, 2021)	Central Bureau of Statistics
$RatioVoc$	Teacher-student ratio of vocational schools in the district/city	Central Bureau of Statistics
$ProdAL$	Labor productivity in the agricultural sector with low education is measured by the number of workers in the agricultural sector, divided by the PDRP constant prices (That, 2016).	Central Bureau of Statistics; data analysis

Further of results of the selection of techniques in dynamic panel data processing have been tested in the form of simultaneous significance testing (Wald test), partial testing (Z test), model specification testing using the Arellano-Bond test (consistency test) and Sargan test (test), instrument validity). A classical assumption test carried out the estimation of Arellano-Bond GMM in dynamic panel data regression. The assumptions that must be met in this research are identical, independent, and normally distributed. In the Arellano-Bond GMM estimation in dynamic panel data regression, the independent residual is the error resulting from the second-order first difference, autocorrelation occurs. Residual autocorrelation test using Arellano-Bond test. Heteroscedasticity testing on this estimate uses the

Sargan test. The result is that there is no problem with the instrument's validity. The normality test on the residuals uses the Shapiro Wilk test.

Results and Discussion

The Tomini Bay area, which surrounds three provinces (North Sulawesi, Gorontalo, and Central Sulawesi), holds various biological potentials, flora, fauna, fisheries and marine, agriculture, minerals, and tourism. Although it has natural resource potential, this area is one of the pockets of poverty in Indonesia, and the quality of human resources is low as measured by HDI. Education is an essential element to accelerate welfare and alleviate poverty. Several factors, including public education spending, must be considered when evaluating the education sector's success. The factors include the contribution of the education sector to the formation of the economy, the average length of schooling, the pure participation rate at the high school level, the labor with high school education, the income of the informal sector workers who graduated from high school, SMA/SMK graduates, teacher-student ratios, and labor productivity in the agricultural sector with low education.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
Pov	100	16.278	4.812922	5.45	22.43
LExpEduc	100	26.14006	.646691	23.79848	27.84931
ShareEeduc	100	.045664	.0201643	.020545	.0905331
ALSchool	100	7.6415	1.164677	5.91	10.36
APMSHS	100	57.2898	10.4955	19.72	75.43
LaborSHS	100	8.803645	1.476813	4.60517	11.92573
LIncome	100	14.22062	.2829885	13.54436	14.85377
SHGraduate	100	8.35088	.6882504	6.553934	9.379577
VocGraduate	100	7.754865	.6365184	6.068426	8.824677
RatioVoc	100	12.01974	5.260317	3	49.53
ProdAL	100	42.38585	18.06621	5.049193	99.13065

Source: Processed Products, (2022).

According to Table 2, it is explained that the average of the data analyzed in this study, namely: Public spending on education is 26.14 percent, the contribution of the education sector to the

formation of the economy is 0.05 percent, the average length of schooling is 7.6 percent, the net enrollment rate in SMA level is 57.28 percent, labor with high school education is 8.80 percent, income for informal sector workers is high school graduates 14.22 percent, high school graduates are 8.35 percent, SMK graduates are 7.75 percent, the teacher-student ratio is 12.01 percent and labor productivity in the sector low-educated agriculture by 42.38 percent.

Based on the estimation results using the dynamic panel data model with the selected System GMM (SY-GMM) estimation model, the test results (Wald Chi) of all coefficient estimators jointly affect poverty in the Tomini Bay Area. While the partial test results (Z-test) of the 11 coefficient estimators have six significant variables, although the results are not all in line with expectations (theory), the complete estimation results are presented in Table 3.

Table 3: Estimation Results of the Short-Run and Long-Run Effects of Education on Poverty

Variable	Coefficient	Standar Error	Z	Short-Run Multiplier	Long-Run Multiplier
$poverty_{it-1}$	.2075222	.2752219	0.75	-	-
LExpEduc	-.075092	.2952055	-2.25*	-.0750917	-.0947556
ShareEduc	-8.96492	45.92777 -	0.20	-8.96492	-11.31252
ALSchool	-3.68824	.8024197	-4.60***	-3.688237	.9544581
APMSHS	-.000153	0171075	-2.01*	-.0001532	-.0001933
LaborSHS	.0628199	.1989859	0.32	.0628199	.0792702
LIncome	1.404663	.4765816	2.95**	1.404663	1.772495
SHGraduate	.7563868	.6081795	1.24	.7563868	-.3002122
VocGraduate	-.237911	.2860929	-2.38 *	-.2379115	-.4265405
RatioVoc	-.023957	.0216982	-1.10	-.0239576	-.0425056
ProdAL	-.003488	.0121368	-2.90**	-.0034885	-.0044021
C	18.82328	12.81807	1.47	-	-

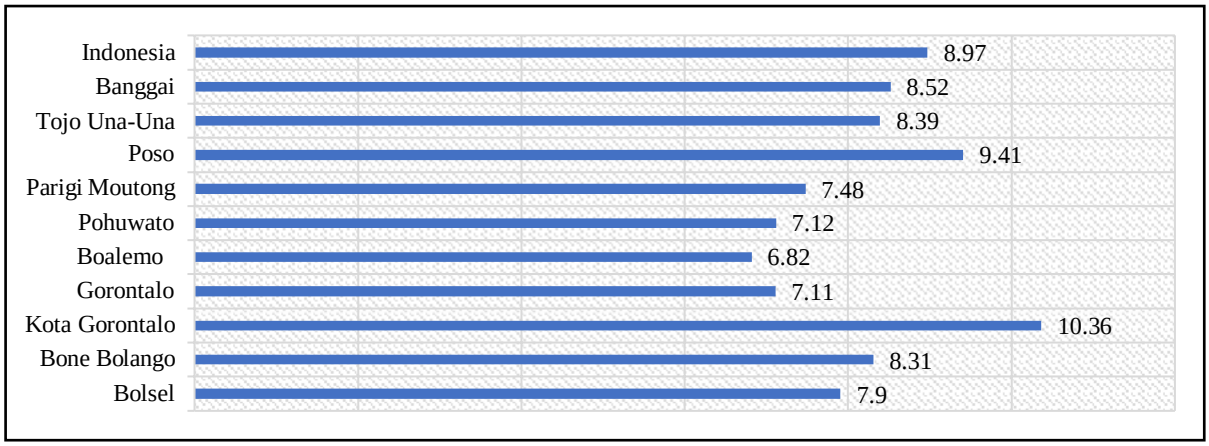
Source: Processed Products, (2022).
*Note: 1 %***, 5 %** dan 10 %**

Based on Table 3, the variable of public expenditure (expenditure) in the education sector by function has a statistically negative effect. This illustrates that if local governments increase public spending on education, it will reduce the poverty rate. In the long term, increasing public spending on education can reduce poverty by 0.09 percent. This finding is in line with previous research conducted by

Arimah (2010), Tarabini and Jacovkis (2012), Hidalgo-Hidalgo and Iturbe-Ormaetxe (2018b), Jung and Thorbecke (2003).

The education sector expenditure allocation has the opportunity to continue to be increased every year following the increase in the State budget and local Government budget because the proportion of the budget allocation for the education sector is 20 percent in the State budget/local Government budget, assuming that state revenues also increase, especially from taxes. However, it is necessary to ensure that 20 percent of the allocation for the education sector is used to promote equal improvement in the quality of education. In reality, the inequality of access to education in each region is still vast. As a result, the quality of school graduates from one region to another is different. For provinces with limited facilities, more extensive funding interventions are needed from the central government because most provinces have minimal local government budgets (Arham and Dai, 2019).

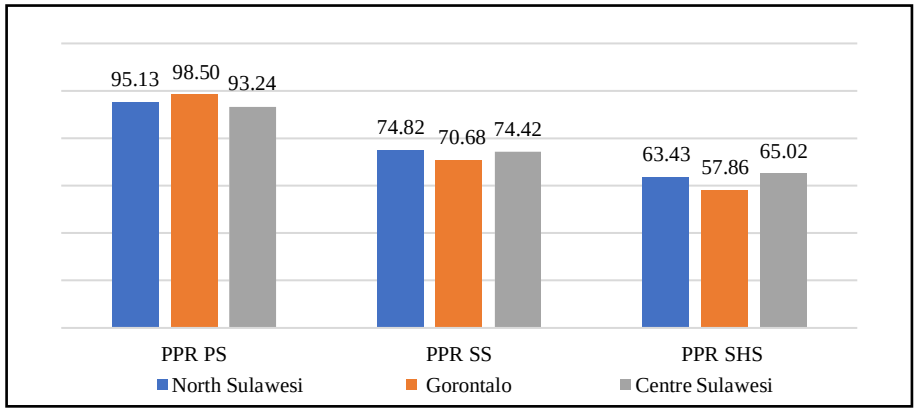
It is hoped that the increase in public spending will encourage increased access to education at every level of education, mainly if it is supported by a free education policy so that the average length of schooling continues to increase. Where the variable Average Years of Schooling (MYS) is statistically proven to reduce poverty rates, in the long term, if residents in each region continue to pursue education, the elasticity of poverty reduction will be more excellent. Average Years of Schooling (MYS) as part of the educational performance is still very limited by researchers using it as an estimator; therefore, this finding is a new phenomenon. MYS is a crucial factor to be considered by the government, but in fact, it is still reasonably unequal in the field of MYS in the Tomini Bay Area. In fact, some of the averages are below the national average, as reflected in Figure 2.



Source: Central Bureau of Statistics, data reanalyzed (2022).

Figure 2: Comparison of Average Length of Schooling in Tomini Bay Area and National, 2020.

Furthermore, the Pure Participation Rate (NER) at the SMA level is the proportion of the population in a particular education level age group who are still in school to the population in that age group. The estimation results show that the NER has a negative correlation with poverty; with the increase in the NER at the SMA level, the number of poor people has decreased, although the elasticity of the decline in both the short and long term is relatively small. In addition, it can be seen in the research area that the AMP at the high school level tends to decrease compared to the NER at the elementary and junior high school levels (see Figure 3 and 4).

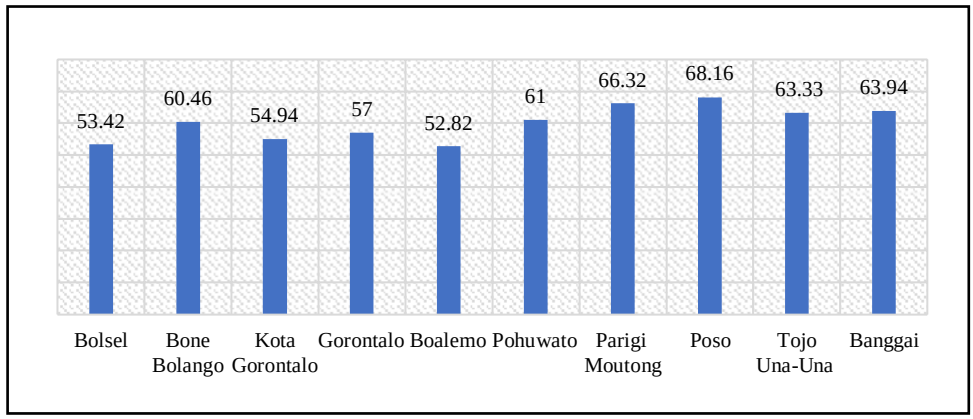


Source: Central Bureau of Statistics, data reanalyzed (2022).

Figure 3: Net Enrollment Rates for Provincial Elementary, Middle and High Schools in the Tomini Bay Area.

The NER at each level of the education unit, apart from decreasing, also tends to experience inequality between regions due to the lack of economic equality. According to Tilak (2018), this condition can

disrupt the education system because regions with large economic sizes develop relatively fast human development.



Source: Central Bureau of Statistics, Data reanalyzed (2022).

Figure 4: The NER Gap in the Tomini Bay Area

The more people who continue their education at the high school level, the more their skill abilities will increase, which can be a provision to enter the labor. However, most of them cannot be absorbed in the formal labor market, so they can only be accommodated in the informal sector. The value of the income coefficient for the informal sector for high school graduates shows a positive direction. In this case, it illustrates that if the income of the informal sector for high school graduates increases, it will have an impact on increasing the number of poor people, both in the short and long term. This phenomenon arises because elementary school graduates and below dominate informal sector workers, therefore if the informal sector prioritizes high school graduates to be employed, workers with elementary school graduates and below will be marginalized so that the number of poor people will increase. In other words, when the income of informal workers increases through an increase in wages, the job opportunities for high school graduates and below are increasingly limited because production input costs will increase so that it will not increase the number of workers. According to Lemos (2004), in order to assist the poor who work in the informal sector, it is necessary to establish a minimum wage, which applies to all workers, not just high school graduates, because an increase

in wages, regardless of education level, increases net income, even if it results in the loss of job opportunities for others because there is no increase in labor input as a result of the wage increase.

In the next stage, the estimation results show that the variable of vocational school graduates has a negative effect on poverty, meaning that more graduates of vocational schools will reduce poverty. In the long term, the increase in the number of vocational school graduates will lead to a reduction in the poverty rate by 0.43 percent. This finding reinforces the results of a study conducted by Zhi and Zhao (2021) that vocational education has the highest input-output ratio and is the best way to alleviate poverty.

Furthermore, labor productivity in the agricultural sector should be encouraged because the estimation results show a negative effect. The more productive the labor in the agricultural sector, the number of poor people, will continue to decline, both in the short term and in the long term. The results of this study are not different from previous studies conducted by Abro et al. (2014) in Ethiopia. However, the research results by Adediyan and Omorenuwa (2021) show that labor productivity in the agricultural sector has a short-term effect on reducing poverty.

Conclusions and Suggestions

Based on the results of model estimation and discussion, several important conclusions can be drawn as follows: 1) Public spending on education, both in the short and long term, effectively reduces poverty in the Tomini Bay Area. 2) The average length of schooling has elasticity in reducing the poverty rate, with an increase in the average length of schooling in each region will accelerate the reduction in poverty rates for the short term and long term. 3) The high school enrollment rate will effectively reduce short- and long-term poverty. 4) Vocational school graduates who have the skills and work readiness can reduce poverty in the short and long term. 5) Even with low education, labor productivity in the agricultural sector can reduce the number of poor people short and long term. 6)

The level of income in the informal sector for high school graduates impacts increasing poverty rates, both short and long term. 7)

Meanwhile, the contribution variables of the agricultural sector, high school labor, high school graduates, and the teacher-student ratio of vocational schools have no effect at all, both in the short and long term, on poverty in the Tomini Bay area. In that context, several suggestions need to be recommended, including; 1) Public spending on education needs to continue to be increased, but the proportion of financing is more focused on financing supporting facilities and improving learning support in schools. 2) Local governments need to continue to encourage more comprehensive access to education for all levels of society by optimizing the existing budget, including utilizing village funds to help underprivileged communities continue their education in rural areas. 3) High school level enrolment rates need to be optimized by local governments and increase the number of schools throughout the region so that the NER at high school level continues to increase. 4) Vocational schools must be built in accordance with the area economic structure and local potential, as well as curriculum improvements with labor market relevance. 5) Improve agricultural labor productivity by providing skills and information through field school education. Aside from that, structural reforms in the economy must be accelerated so that labor in the agricultural sector does not accumulate and some labor goes to the formal sector.

Apart from the important findings resulting from this study there are limitations. The limitations are caused by several indicators of educational performance that are not included as a determinant factor affecting poverty rate. To make it more comprehensive, the number of problems (phenomena) of future research needs to be expanded, and a longer period of time is needed for complete and reliable investigation.

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Notifications

[IJEFS] Editor Decision

2022-11-12 04:08 PM

Amir Arham:

We have reached a decision regarding your submission to International Journal of Economics and Finance Studies, "Does Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach: Education and Poverty ".

Our decision is to: Accept Submission

International Journal of Economics and Finance Studies

Universitas Negeri Gorontalo UNGmail

Muhammad Amir Arham <muhammad.arham@ung.ac.id>

[IJEFS] Editor Decision

10 pesan

Editor <editorial@sobiad.org> 2 Oktober 2022 pukul 20.35
Kepada: Amir Arham <muhammad.arham@ung.ac.id>

Amir Arham:

We have reached a decision regarding your submission to International Journal of Economics and Finance Studies, "Does Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A SystemsDynamic Approach: Education and Poverty ".

Our decision is: Revisions Required

Reviewer A and B:

Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach

Abstract

- Remove **;** from title.
- Add recommendations for policy implications.Add
- some relevant keywords.
- Add JEL classification codes.

Introduction

- Try to add just focusing objectives, Add many of the objectives is not a good practice.Add
- some theory point of view which support this study.
- Add structure of the study.

Literature Review

- Add some details of methodology and data analysis technique of previous studies.Add novelty
- of the study.

Methodology

- Add conceptual framework for better understanding of the study.Cite
- previous studies which use the same variables.
- Cite previous studies which use the same data analysis technique.
- Try to add description of data in tabular form which consists of symbol, description, measuring unit, datasource and reference.

Results

- Where is the data analysis tables? Add
- tables with their descriptions. Add
- proper heading of tables.

Conclusion

- Add some recommendations for further studies.

References

- Use just English reference otherwise convert it in English language.

General Comments

- Overall good work.

Recommendation: Accept Submission

International Journal of Economics and Finance Studies

Muhammad Amir Arham <muhammad.arham@ung.ac.id> 4 Oktober 2022 pukul 15.29
Kepada: amier_archam@yahoo.com

--------- Pesan yang diteruskan --------
Dari: **Editor** <editorial@sobiad.org>
Tanggal: Min, 2 Okt 2022 pukul 20.35
Subjek: [IJEFS] Editor Decision
Ke: Amir Arham <muhammad.arham@ung.ac.id>
[Kutipan teks disembunyikan]

Muhammad Amir Arham <muhammad.arham@ung.ac.id> 12 November 2022 pukul 08.16
Kepada: Editor <editorial@sobiad.org>

Greetings!
Thank you for decision to accept out article entitled "Does the Education Sector Contrbute to Overcoming Poverty in the Tomini Bay Area of Indoensia; A System Dynamic Approach", we have made improvements according to the suggestions from the reviewers. we have submitted the revised results.

Best Regards
Dr. Muh. Amir Arham
[Kutipan teks disembunyikan]

editorial@sobiad.org <editorial@sobiad.org> 13 November 2022 pukul 06.09
Kepada: Muhammad Amir Arham <muhammad.arham@ung.ac.id>

Amir Arham:

We have reached a decision regarding your submission to International Journal of Economics and Finance Studies, "Does Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A SystemsDynamic Approach: Education and Poverty ".

Our decision is to: Accept Submission

Please find the attachments to get acceptance letter and payment invoice. Please make the payment within 3 days. Regards
Editorial Team

On 2022-10-19 18:16, Muhammad Amir Arham wrote:

> Greetings!
> Thank you for decision to accept out article entitled "Does the Education Sector Contrbute to Overcoming Poverty in the Tomini Bay Area of Indoensia; A System Dynamic Approach", we have made improvements according to the suggestions from the reviewers. we havesubmitted the revised results.
>
> Best Regards
> Dr. Muh. Amir Arham

Min, 2 Okt 2022 pukul 20.35 Editor <editorial@sobiad.org> menulis:Amir

Arham:

We have reached a decision regarding your submission to International Journal of Economics and Finance Studies, "Does Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach: Education andPoverty ".

Our decision is: Revisions Required

Reviewer A and B:

Does the Education Sector Contribute to Overcoming Poverty in theTomini Bay Area of Indonesia?; A Systems Dynamic Approach

Abstract

* Remove ; from title.
* Add recommendations for policy implications.
* Add some relevant keywords.
* Add JEL classification codes.

Introduction

* Try to add just focusing objectives, Add many of the objectivesis not a good practice.
* Add some theory point of view which support this study.
* Add structure of the study.

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* Add some details of methodology and data analysis technique of previous studies.
* Add novelty of the study.

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* Add conceptual framework for better understanding of the study.
* Cite previous studies which use the same variables.
* Cite previous studies which use the same data analysis technique.
* Try to add description of data in tabular form which consists of symbol, description, measuring unit, data source and reference.

Results

* Where is the data analysis tables?
* Add tables with their descriptions.
* Add proper heading of tables.

Conclusion

* Add some recommendations for further studies.

References

* Use just English reference otherwise convert it in English language.

General Comments

* Overall good work. Recommendation:

Accept Submission

International Journal of Economics and Finance Studies [1]

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Muhammad Amir Arham <muhammad.arham@ung.ac.id> 15 November 2022 pukul 09.33
Kepada: amier_archam@yahoo.com

--------- Pesan yang diteruskan --------
Dari: <editorial@sobiad.org>
Tanggal: Sen, 13 Nov 2022 pukul 06.09Subjek: Re:
[IJEFS] Editor Decision
Ke: Muhammad Amir Arham <muhammad.arham@ung.ac.id>
[Kutipan teks disembunyikan]

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Muhammad Amir Arham <muhammad.arham@ung.ac.id> 16 November 2022 pukul 08.15
Kepada: editorial@sobiad.org

Dear Managing Editor.

Thank you for your decision to accept our article for publication on IJEFS. However, I ask important questions; If you look at the archives from IJEFS last year there were only two issues, but in 2022 there will be four issues. Is this common and has no potential to be discontinued in the journal?

Questions to be answered before we make a payment.

Best Regards

Dr. Muh. Amir Arham

[Kutipan teks disembunyikan]

editorial@sobiad.org <editorial@sobiad.org> 17 November 2022 pukul 03.00
Kepada: Muhammad Amir Arham <muhammad.arham@ung.ac.id>

Dear Authors

We have approval from Scopus to increase the number of issues. The journal is progressing very well and cite scoreincreased. We are expecting the journal will be Q2 by next year.

Regards
Editorial Team
[Kutipan teks disembunyikan]

Muhammad Amir Arham <muhammad.arham@ung.ac.id> 18 November 2022 pukul 08.28
Kepada: editorial@sobiad.org

Thank you for the explanation, I hope this journal will continue to grow and become more reputable. Please, because it's the weekend, we can't make transactions at the bank for APC payments. Our plan is to make payments on November 21, Monday. Hope you can understand this.

Best regards

Muh. Amir Arham
[Kutipan teks disembunyikan]

Muhammad Amir Arham <muhammad.arham@ung.ac.id> 21 November 2022 pukul 21.05
Kepada: editorial@sobiad.org

The editorail team.
Here we send an invoice proof of APC payment.

Best Regards Muh.

Amir Arham
[Kutipan teks disembunyikan]

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editorial@sobiad.org <editorial@sobiad.org> 21 November 2022 pukul 23.57
Kepada: Muhammad Amir Arham <muhammad.arham@ung.ac.id>

Dear Authors

We have received your payment. Your paper will be published within 14 days.
[Kutipan teks disembunyikan]

Social Sciences Bibliography Indexes and Archives Data

International Journal of Economics and Finance Studies (IJEFS)
ISSN: 1309-8055

Date: 12th Nov 2022
Paper ID: IJEFS-1110-2022

Dear Authors

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Congratulations upon the acceptance of your research paper into our Scopus Indexed Journal.

It is my pleasure to inform you that, after the peer review, your paper, **"Does the Education Sector Contribute to Overcoming Poverty in the Tomini Bay Area of Indonesia?; A Systems Dynamic Approach"** has been ACCEPTED to publish with International Journal of Economics and Finance Studies, ISSN: 1309-8055. It will be published in the 01st December 2022 (Volume 14 issue 04). I believe that our collaboration will help to accelerate the global knowledge creation and sharing one-step further. Please do not hesitate to contact me if you have any further questions.

Sincerely,

Managing Editor

International Journal of Economics and Finance Studies (IJEFS)
ISSN: 1309-8055

INTERNATIONAL JOURNAL OF ECONOMICS AND FINANCE STUDIES
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-RESEARCH ARTICLE-

DOES THE EDUCATION SECTOR CONTRIBUTE TO OVERCOMING POVERTY IN THE TOMINI BAY AREA OF INDONESIA? METHOD OF MOMENTS QUANTILE APPROACH

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─Abstract─

Although there are numerous potential resources in the Tomini Bay area, their exploitation has not been optimized for the community's benefit, and the poverty rate in the region is relatively high. On this basis, this study was conducted to evaluate the contribution of the education sector, which is believed to be capable of enhancing the quality of human resources and aiding in poverty reduction. Method of Moments Quantile Regression (MMQR) was utilized to analyze ten locations over the past ten years (2011–2020). Results suggested that government expenditures on education,

Citation (APA): Arham, M. A., Akib, F. H. Y., Anam, H. (2022). Does The Education Sector Contribute to Overcoming Poverty in The Tomini Bay Area of Indonesia? Method of Moments Quantile Approach. *International Journal of Economics and Finance Studies, 14* (04), 114-134. doi:10.34111/ijefs. 20220107

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education share in cities, enrollment rate in schools, education level among labor, income level of graduates, and labor production level in the agriculture sector are negatively correlated with the poverty rate in Indonesia. This study advises policymakers on developing the formal sector (labor-intensive investment) to facilitate the incorporation of high school graduates into the labor force by providing work-related skills.

Keywords: Potential Resources, Performance of Education, Rural Poverty, Tomini Bay.

JEL Classifications: A20, H75, I121

1. INTRODUCTION

One of the aims of economic development in a country (area) is eradicating poverty. Based on the experiences of both industrialized and developing nations, it is possible to eliminate poverty by maximizing all available resources. According to Acharya et al. (2019), natural resources are crucial accelerators for economic development in developing nations. Ulucak et al. (2020) argue that natural resources have several functions as drivers, the most promising paths, and effective escape mechanisms for overcoming poverty, particularly for dominating agrarian countries (regions) like the Tomini Bay Area in Indonesia. The Tomini Bay region possesses various potential natural resources that might serve as the foundational capital for economic development. However, the three districts of the Tomini Bay Area have high poverty rates. In 2020, the population of South Bolaang Mongondow Regency in North Sulawesi was 12.77 percent, Boalemo Gorontalo Regency was 18.57 percent, and Tojo Una-Una Regency in Central Sulawesi was 16.6 percent. In the world's largest bay, North Sulawesi Province, Gorontalo Province, and Central Sulawesi Province have rural poverty rates of 10.25%, 14.69%, and 23.45%, respectively (Arham et al., 2020).

This pattern indicates that the availability of natural resources is not the sole factor that can stimulate economic growth (welfare). Human resources and human capital are required additional variables. According to Pomi et al. (2021), human capital drives economic growth and contributes favorably to economic development. This conclusion, however, contradicts the findings of Ogundari et al. (2018), who showed that human capital was not a significant predictor of economic growth. Recent studies have shown, however, that improving skills at all levels of education have a substantial long-term impact on economic growth (Liang et al., 2019). Moreover, human capital can simultaneously promote long-term economic expansion and alleviate poverty (Doepke et al., 2019). Indonesian stakeholders, including the central and local governments, acknowledge that human development investment must be prioritized in policymaking through the education sector. As a result of the reform, the education budget allocation has been set at a minimum of 20% of the State Revenue and Expenditure Budget (APBN) and the National Revenue and Expenditure Budget. Spending in the Regions (APBD). The provision of funds is anticipated to expedite human resource quality improvement.

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Nonetheless, this premise has not been utilized to its maximum capacity. As measured by the Human Development Index, there are still disparities between regions regarding human development (HDI). Even though each region's HDI has gradually increased, the HDI in the Tomini Bay Area is still below the national average, except for Gorontalo City (see Graph 1). Human development is a priority for all regions. Hence this scenario deserves additional examination.

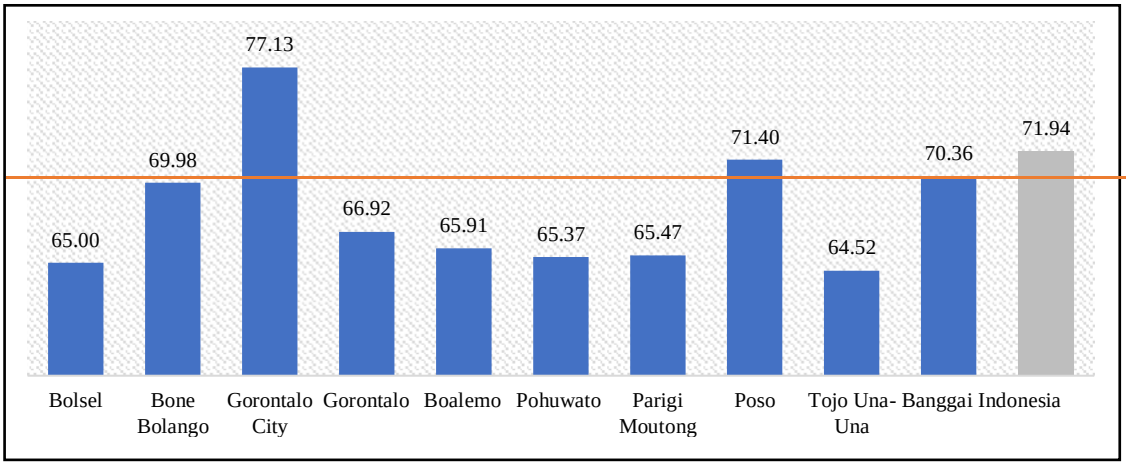

Figure 1. Comparison of HDI Levels in Indonesia
Source. Central Bureau of Statistics

Economy, education, and health are the three components of the HDI. This study focuses on the education sector's performance, which has a relatively significant annual budget. The education sector's budget (public expenditure) strongly affects poverty reduction (Sarkodie et al., 2020). (Sarkodie et al., 2020). Other supporting factors include the contribution of the education sector to the economic formation, the Pure Participation Rate (NER) at the high school level, the average length of schooling, high school graduates, vocational high school students, teacher-student ratios for SMA/SMK, and income levels in the informal sector. Access to education is directly determined by the number of high school graduates, the proportion of the labor force with a high school education, and the agricultural sector's labor productivity. Furthermore, the components supporting the formation of the HDI from the perspective of educational performance want to see their direct impact on poverty by taking samples at the high school or equivalent level, assuming that the higher the level of school participation, the better the quality of human resources (Yao et al., 2019). In addition to proving that greater access to education can increase human quality, the necessity of high school education and the effectiveness of many local government efforts that make high school education free are examined. Hofmarcher (2021) asserts that increasing educational participation can reduce poverty rates. A higher level of education has relatively stronger positive effects on household welfare. Despite the findings of Sule et al. (2022), the poor were not assisted by the SMA participation rate. In addition to assessing the degree of access to

education and the average length of high school education in this study, it is essential to compare the effects of public and vocational school graduates on poverty. There is a growing global interest in enhancing vocational education and expanding the number of vocational schools to rapidly and successfully integrate young people into the workforce by equipping them with specialized skills (Bower et al., 2019). Meanwhile, because there are more public secondary schools throughout Indonesia (including the Tomini Bay Area), it is assumed that the profile of public school graduates is unconnected to the availability of work prospects and the area's potential, which affects the minimum reduction in poverty. Developing vocational education is crucial for economic and social growth in deprived areas, according to China's experience (Arsani et al., 2020).

In the regions, public and vocational (vocational) schools are frequently managed identically, primarily when recruiting human resources (teachers). While there is a need for vocational school instructors to engage with industry, become network advocates outside of educational institutions, and prepare students to enter the workforce (Paul, 2019) so that they are not unemployed when they graduate (Paul, 2019). Because of the proportional relationship between poverty and unemployment, Plucker et al. (2018) suggest that policymakers develop vocational training programs to alleviate unemployment challenges. Alternatively, the teacher-student ratio for high school (vocational) pupils must be investigated immediately, as a high ratio is connected with low achievement (Banerjee et al., 2021). Only urban schools have a low teacher-to-student ratio, whereas rural schools have a high teacher-to-student percentage. This external influence leads student achievement to be higher in urban regions than in rural areas, resulting in a higher quality of human resources (IPM) and lower poverty rates in urban areas. Furthermore, because informal sector laborers make up most of the labor in the Tomini Bay Area, this study focuses on their income after high school. According to Khan et al. (2019)'s empirical study, the informal sector can help maintain social stability but cannot eradicate poverty. However, Bates (2018)'s research demonstrates that informal laborers can assist in relieving poverty. Aside from informal sector workers, the number is relatively high due to educational issues that make productive sector employment less desirable. Because the rural poverty rate is still relatively high and most rural residents are farmers, it is essential to examine the agriculture sector's labor productivity. Consequently, it is vital to determine if the high rate of rural poverty in the Tomini Bay region results from low farmer production or some other factor. The findings of Perrin et al. (2020)'s investigation in Africa indicated that agricultural value-added per worker could relieve rural poverty.

In contrast to the preceding explanation, the urgency of this research is determined by examining three factors: 1) Although the Tomini Bay region possesses significant natural resources, the poverty rate is still high, creating a paradox. 2) The education sector is a regional focus, although the quality of human resources measured by the Human Development Index (HDI) is still below the national average. 3) Several

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empirical studies on variables that support the education sector's performance show varied results so that researchers can conduct future studies. Determining the performance impact of the education sector on poverty reduction in the resource-rich Tomini Bay Region of Indonesia is the objective of the present study. The research described in this publication is structured as follows. The first part introduces the study's history, significance, and purpose. The second section provides theoretical studies about the education sector's performance and poverty, as well as a review of prior research. The third section describes the methodology, conceptual framework, and data collection. The fourth portion covers the results derived from dynamic panel data, while the final section contains the research's conclusions and policy recommendations.

2. LITERATURE REVIEW

Investing in human capital or human development is the key to accelerating economic growth and offers a greater return on investment regarding increasing output (Musibau et al., 2019). If just relying on natural resource riches, it has been demonstrated that many nations do not become entrapped by natural richness. Natural resources are neither a boon nor a blessing. Multiple studies indicate that abundant natural resources do not necessarily foster economic development. Investing in human capital through education must be a top priority in this scenario. According to Jorgenson et al. (2020), participation in primary, secondary, and higher education significantly impacts economic growth. The financial growth mechanism affects poverty reduction, with a faster rate of economic growth reducing poverty more rapidly in this instance.

Nonetheless, inclusive and sustainable economic expansion is required. Zhu et al. (2018) contend that equitable and sustainable economic growth is impossible without the substantial contribution of people's talents, knowledge, and values, also known as human resources. As a result, the rise in government expenditure on human capital investment through the education sector must receive a larger share than other sectors, as it has been shown to contribute to poverty reduction significantly. Kocourek et al. (2018) empirically demonstrate this theoretical explanation. Their study utilized time series regression analysis from 2005 to 2011 with the addition of a dummy variable to compare the expenditures of families with and without a high level of education. The findings revealed that public spending on education had a significant long-term impact on poverty reduction and that families with less education were more likely to remain poor. According to Tchamyou et al. (2019), higher public spending on human development enhances human quality indicators (HDI) and complements economic growth. The education sector influences human development and helps the formation of the economy in this regard. Even during the Covid-19 pandemic in Indonesia, the education and banking, and communication sectors developed positively while these sectors contracted. Therefore, the education sector is resilient to withstand crises, influence economic growth, and combat poverty simultaneously. Tang (2021) did a study to determine the influence of education in reducing poverty. The model was estimated

using time series data from 1980 to 2018 and the Engle-Granger two-step co-integration technique to determine the long-term and short-term economic dynamic aspects of education to eliminate poverty in the present age. The results found that education significantly reduced poverty rates, with higher education reducing poverty significantly. According to Efendi et al. (2019), education is crucial in reducing poverty and can prevent the following generation from becoming significantly poorer.

However, the education researched thus far has a macro perspective. This study employs several micro variables, such as the average length of schooling, to produce a composite HDI. The Average Length of Schooling (RLS) is the number of years a population receives formal education (Zafar et al., 2022). RLS can determine the amount of community education in an area. Indonesia's RLS is 7.95 years, suggesting that, on average, Indonesians aged 25 years and above have studied for 7.95 years or have practically finished class VIII. RLS can determine the quality of community education in a given area; hence, the higher the RLS, the higher the quality of human resources. In Indonesia, however, RLS and poverty reduction have been linked in several studies with varying outcomes. For example, the study by Hüseyin et al. (2018) employed the multiple linear regression analysis methods with the Ordinary Least Square (OLS) approach from 2005 – 2019. The results suggested that the average length of education had a negative and statistically significant impact on poverty reduction. This result is consistent with Prasetyo et al. (2020)'s investigation. Diebolt et al. (2022)'s study, which utilized associative quantitative research and analytical procedures in panel data analysis with a fixed effect model, found that RLS did not affect poverty.

The Net Enrollment Rate is an additional measure that supports education performance (NER). The Central Bureau of Statistics defines the population of a particular school age group that is currently attending school at the appropriate level of education (according to the age of the population with the provisions of school age at that level) as the proportion of that population that is currently attending school at the appropriate level. Non-Formal Education (Package A, Package B, and Package C) has been under consideration since 2007. The rise in the NER across all grade levels suggests more significant equity and access to education. This will then affect poverty reduction. Even though the association between APM and poverty remains controversial, multiple research findings indicate that an increase in APM affects poverty. Still, a study by Bulturbayevich et al. (2020), which utilized the multiple linear regression approach from 2008 to 2017, showed that the rise in the APM had no meaningful impact on reducing the poverty rate. It is anticipated that the growth in RLS and NER will raise the education level of the labor force to the high school level (SMA) since a higher level of education will make it simpler for the labor force to find employment outside the agriculture sector. Considering that the capacity of the agricultural sector to absorb labor is increasing smaller, there is even an accumulation that results in high poverty rates in rural areas. The current position of policymakers is that secondary and higher education is

unnecessary for economic progress. Hence, the government's attention is more concentrated on primary education, as indicated by the nine-year obligatory education program, in this case, just at the junior high school level being the aim for completion. Few local governments mandate education through the high school level; hence, secondary and postsecondary education is not a priority for many developing nations and international aid agencies (Xu et al., 2020). Even though there is a strong correlation between higher levels of education and a reduction in poverty and labor force participation, there is still a significant correlation between the two. The research of Collin et al. (2020) offers a strategy for alleviating poverty that emphasizes human development by expanding labor force education participation.

The premise is that a higher participation rate in education will boost production and income. Workers in Indonesia have been dominated by the informal sector, which includes self-employment, attempting to be assisted by non-permanent workers, attempting to be administered by permanent workers, laborers/employees, freelance workers in agriculture, casual workers in non-agriculture, and family workers. /not paid. The Central Statistics Agency (BPS) reported that informal laborers increased by 2.64 million between August 2020 and February 2021, from 77.68 million to 78.14 million. In an ideal world, a more significant share of labor would be found in the formal sector, but this is not the case in Indonesia. Numerous employees are not unemployed because of the informal sector, despite many informal workers having an insufficient income. According to Bosco et al. (2019), the informal sector can sustain social stability but cannot eliminate poverty.

A considerable number of workers in the informal sector contributes to the high percentage of rural poverty. According to Matthew et al. (2018), reducing poverty necessitates improving the conditions of workers in the informal sector, which entails paying minimum salaries and providing training. Based on this theoretical explanation, the emphasis on economic growth is on developing the formal sector (real sector) and increasing the income levels of informal workers to eliminate poverty. This research aims to address a gap in the literature by establishing a correlation between the education level (high school graduates) of informal sector employees in the Tomini Bay Region of Indonesia and poverty.

High school graduates further influence academic excellence (general and vocational). As the proportion of high school graduates rises, educational performance is deemed to improve. The phenomenon observed thus far is that the proportion of high school graduates with advanced degrees is decreasing. Not all elementary school graduates continue to junior high, etc. In contrast, both general and vocational high school graduates have an impact on improving productivity, which can reduce poverty. The results of a study conducted by Papadakis et al. (2020) on 1,280 disadvantaged households in Longsheng County and Ziyuan County in China's Guangxi Zhuang Autonomous Region indicate that the impact of general and vocational high school

graduates tends to be different. The findings demonstrate the long-term effects of alleviating poverty through vocational education, particularly in rural areas. According to Asongu et al. (2021), policymakers in many developing nations view technical and vocational education and training at the senior secondary level as crucial to economic growth and poverty alleviation. In light of the existence of vocational education as a method of human development, the European Union countries (partner countries) have undertaken several attempts to improve the teaching and vocational training system for human resource development, according to McGrath (2012). In contrast to the situation in Indonesia, vocational schools face numerous obstacles, such as being considered secondary schools, the majority of students coming from low-income families, the lack of adequate facilities, and teacher competence that is less relevant to the field of education, all of which have an impact on a large number of students. Compared to public school graduates, vocational school graduates have a higher unemployment rate (Silva-Laya et al., 2020).

Therefore, the competence of professors at technical and vocational schools is a crucial aspect that can enhance the quality of graduates. The ratio of teachers to students cannot be overlooked. According to Keeney et al. (2019), a smaller teacher-to-student ratio will result in a high level of literacy and achievement. In contrast, performance in literacy declines as group size (ratio) increases. This necessitates focusing on the teacher-to-student ratio to ensure that high school graduates have the necessary skills and qualifications. As a result, additional research into the effect of teacher-student ratios on student achievement and the production of competent graduates in vocational schools is required.

The open unemployment rate among vocational school graduates is now the greatest. Thus it is anticipated that recent graduates will be able to find employment immediately. The significant number of educated unemployed will undoubtedly affect poverty. The variable teacher-pupil ratio of vocational schools is a novelty of this research, which will fill in the gaps in the literature. Although the teacher-student ratio plays a vital function in improving accomplishment to generate graduates with high competence, research has thus far centered on teacher quality, and instructional approaches are regarded to have a more substantial influence on growing student achievement (Awan et al., 2020).

High competency is needed to work in different areas, including the agriculture industry, and they have increased productivity. According to Abaidoo (2021), there is a strong association between macroeconomic stability and poverty. The underlying element tying growth to poverty is labour productivity, which is closely associated with poverty. This viewpoint is congruent with Ivinson (2020)'s study, which utilized data from the 2009 Cambodian Socio-Economic Survey (CSES). This study examines the effects of worker and land productivity on the poverty of rice-farming households in Cambodia. Conclusion: improving agriculture's labor productivity is the way to alleviate poverty in

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rural areas. Although the connection between educational achievement and poverty has been thoroughly studied in the literature, many unsolved concerns remain.

Therefore, additional research is necessary to investigate the dynamic relationship between educational attainment and poverty, especially for the region's economy, which is dominated by the agriculture sector and has other potential natural resources. This study, therefore, was carried out to fill a gap in the literature by using educational performance as measured by education sector financing, education sector contribution to the economic formation, the average length of schooling, NER level at senior high school level, the workforce of high school graduates, high school and vocational high school graduates, and labor productivity in the agricultural sector with low education as the main variables (Ellison et al., 2020). Meanwhile, the wage level of informal sector employees who graduated from high school and the teacher-student ratio of vocational schools are additional factors and updates from prior studies.

3. RESEARCH METHODS

Study Site and Design

This study used multiple regression using a dynamic panel data methodology spanning ten regions in the Tomini Bay Area and three provinces, namely North Sulawesi, Gorontalo, and Central Sulawesi, over the past ten years (2011 – 2020). To assist comprehension of the link between study variables. This is how the econometric model is constructed.

$$POVR_{it} = \gamma_0 + \gamma_1 GEEX_{it} + \gamma_2 EDS_{it} + \gamma_3 NER_{it} + \gamma_4 LEL_{it} + \gamma_5 INC_{it} + \gamma_6 LPAS_{it} + \varepsilon \quad (1)$$

Where,

$POVR$ = Poverty Rate
$GEEX$ = Government Educational Expenditures
EDS = Education Share in City
NER = Net Enrolment Rate
LEL = Labour Education Level
INC = Income Level of high school graduates
$LPAS$ = Labour Productivity in the Agricultural Sector

The research employed poverty as a predictive variable and quantified it as a rural poverty rate %. In addition, six factors were included in the study: government education expenditures, education share in cities, net enrollment in schools, labor education level, income level of high school graduates, and agricultural labor productivity. Table 1 displays the measurement and data sources of the model.

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Table 1. A Description of Research Variables

Variable	Measurement	Sources
Poverty Rate	Percentage (P0) of the district/city rural poverty level in the Tomini Bay Area.	Central Bureau of Statistics
Government Educational Expenditures	The amount of local government spending in the education sector, in rupiah.	Central Bureau of Statistics
Education Share in City	Percentage of business field contribution in the education sector on the economic formation.	Central Bureau of Statistics
Net Enrolment Rate	Percentage of Senior High School Net Enrollment Rate.	Central Bureau of Statistics
Labor Education Level	Percentage of the labor force employed by the level of high school education.	Central Bureau of Statistics
Income	Informal Sector Income at the district/city level by high school graduates.	Central Bureau of Statistics
Labor Productivity in the Agricultural Sector	Labor productivity in the agricultural sector with low education is measured by the number of workers in the agricultural industry divided by the PDRP constant prices	Central Bureau of Statistics; data analysis

Using descriptive statistics, the study examined the specifics of the constructs. In addition, the correlation matrix was utilized to analyze the correlation between the predictors. In addition, the variance inflation factor (VIF) was utilized to assess the model's multicollinearity. The following are the equations:

$$R^2_Y \longrightarrow Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it} \quad (2)$$

$$j = R^2_Y, R^2_{X1}, R^2_{X2}, R^2_{X3}, R^2_{X4}, R^2_{X5} \quad (3)$$

$$Tolrance = 1 - R^2_j \quad VIF = \frac{1}{Tolerance} \quad (4)$$

The research also applied the MMQR to check the relationships between the constructs. This approach was introduced by Machado et al. (2019). This approach effectively deals with outliers and manages panel heterogeneity (Ike et al., 2020). In addition, this model provides dynamic outcomes in different situations, although the framework is non-linear (Aziz et al., 2020). This approach also controls panel studies' endogeneity and heterogeneity issues (An et al., 2021). Hence, the conditional quantile estimation is $Qr(r/X)$ for the locational-scale alternate model is mentioned below:

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$$Y_{it} = \alpha_i + X_{it}\beta + (\delta_i + Z_{it}\lambda)U_{it} \quad (5)$$

Where, $P\{\delta_i + Z_{it}\lambda > 0\} = 1$. show the probability, α, β, λ and δ shown the parameters and α_i, δ_i i = 1, … . . , n shown the individual fixed-effect. Therefore, the components are transformed with element l is given as:

$$Zl = Zl\,(X), l = 1, \ldots \ldots, k \quad (6)$$

Where, U_{it} shown the orthogonal to X_{it}. Therefore, the conditional quantile of Y is mentioned below:

$$Qr(r/X_{it}) = (\alpha_i + \delta_i q(r)) + X_{it}\beta + Z_{it}\,\lambda\, q(r) \quad (7)$$

Where, X_{it} The independent constructs include GEEX, EDS, NER, LEL, INC, and LPAS. In contrast, Y_{it} It is a dependent construct like POVR. Hence $Q(r)$ is estimated as mentioned below:

$$Min_q = \sum_t \sum_i pr\,(R_{it} - (\delta_i + Z_{it}\,\lambda\,)q) \quad (8)$$

4. RESULTS AND DISCUSSION

Using descriptive statistics, the study examined the specifics of the constructs. The Tomini Bay region, which encompasses three provinces (North Sulawesi, Gorontalo, and Central Sulawesi), possesses many biological potentials, including flora, fauna, fisheries and marine resources, agriculture, minerals, and tourism. Despite its natural resource potential, this region is one of the most impoverished in Indonesia, as indicated by the Human Development Index (HDI). Education is vital for increasing social progress and reducing poverty. When analyzing the success of the education sector, several criteria, such as public education spending, must be taken into account. The factors include the contribution of the education sector to the formation of the economy, the average length of schooling, the pure participation rate at the high school level, the labor with a high school education, the income of high school-educated informal sector workers, and the labor productivity in the agricultural sector with low education. This data is shown in Table 2.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
POVR	100	16.278	4.813	5.450	22.430
GEEX	100	26.1401	0.647	23.798	27.849
EDS	100	0.046	0.021	0.020	0.091
NER	100	7.642	1.165	5.910	10.360
LEL	100	8.804	1.477	4.605	11.926
INC	100	14.221	0.283	13.544	14.854
LPAS	100	42.386	18.066	5.049	99.131

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In addition, the correlation matrix was utilized to analyze the correlation between the predictors. Results suggested that government expenditures on education, education share in cities, enrollment rate in schools, education level among labor, income level of graduates, and labor production level in the agriculture sector are negatively correlated with the poverty rate in Indonesia. These numbers are presented in Table 3.

Table 3. Correlation Matrix

Variables	POVR	GEEX	EDS	NER	LEL	INC	LPAS
POVR	1.000						
GEEX	-0.593	1.000					
EDS	-0.448	0.742	1.000				
NER	-0.271	0.219	0.625	1.000			
LEL	-0.204	0.732	0.435	-0.526	1.000		
INC	-0.429	0.281	0.123	0.121	0.302	1.000	
LPAS	-0.290	0.772	-0.352	-0.123	-0.299	0.324	1.000

In addition, the VIF was utilized to investigate the multicollinearity of the model. Results revealed that the reciprocal VIF values are more significant than 0.20 and that VIF values are less than five. These results indicated that there is no multicollinearity issue. These numbers are presented in Table 4.

Table 4. Variance Inflation Factor

	VIF	1/VIF
GEEX	3.201	0.312
EDS	3.102	0.322
NER	2.881	0.347
LEL	2.710	0.369
INC	2.133	0.469
LPAS	1.892	0.529
Mean VIF	2.653	.

In addition, the MMQR was used to examine the correlations between the components. Results suggested that government expenditures on education, education share in cities, enrollment rate in schools, education level among labor, income level of graduates, and labor production level in the agriculture sector are negatively correlated with the poverty rate in Indonesia. These numbers are presented in Table 5.

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Table 5: Panel Quartile Estimation (MMQR)

Variables	**Method of Moments Quantile Regression (MMQR)**										
	Location	**Scale**	**Grid of Quartiles**								
			0.10	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**
GEEX	0.453***	0.643*	-0.654**	-0.657**	-0.666*	-0.434**	-0.544*	-0.432*	-0.564*	-0.534*	-0.342*
EDS	0.342**	0.187*	-0.776*	-0.574*	-0.875*	-0.768*	-0.643**	-0.544**	-0.666**	-0.434*	-0.021
NER	0.754**	0.654**	-0.476*	-0.265*	-0.143	-0.544*	-0.611*	-0.432*	-0.121	-0.756**	-0.153*
LEL	0.476**	0.756*	-0.453*	-0.655**	-0.675*	-0.765**	-0.213*	-0.543*	-0.232	-0.231*	-0.053
INC	0.655**	0.468**	-0.755*	-0.709*	-0.657**	-0.477*	-0.499*	-0.121	-0.743*	-0.443**	-0.342**
LPAS	0.276*	0.655**	-0.564*	-0.654**	-0.632**	-0.474*	-0.123	-0.111	-0.564*	-0.353*	-0.154

***, **, and * represent significant level at 1%, 5%, and 10%, respectively

5. DISCUSSIONS

The study's results revealed that public expenditures in the education sector by function have a statistically negative impact. This demonstrates that if local governments boost investment in education, the poverty rate will decrease. Increasing public spending on education can lower poverty by 0.09 percent over the long term. This result is consistent with recent studies by Gowayed (2018). The education sector expenditure allocation has the opportunity to continue to be increased every year following the increase in the State budget and local Government budget because the proportion of the budget allocation for the education sector is 20 percent in the State budget/provincial Government budget, assuming that state revenues also increase, especially from taxes. However, it is vital to ensure that 20 percent of the allocation for the education sector is used to support equivalent progress in the quality of education. There is still a significant disparity in access to education between regions. Consequently, the quality of school graduates varies from region to region. Most provinces have meager local government budgets, necessitating significant central government financing interventions for provinces with poor infrastructure (Yuan et al., 2023).

It is hoped that the increase in public investment will stimulate greater access to education at all levels, mainly if a free education policy accompanies it so that the average length of schooling continues to rise. Where the variable Average Years of Schooling (MYS) is statistically demonstrated to reduce poverty rates, the elasticity of poverty reduction will improve over time if inhabitants in each region continue to pursue education. Average Years of Schooling (MYS) as an indicator of educational success is still underutilized by researchers; hence, this discovery is novel. MYS is a vital aspect that must be regarded by the government, although the field of MYS in the Tomini Bay Area remains relatively unequal. Some averages are lower than the national average. In addition, the Pure Participation Rate (PPR) at the SMA level is the proportion of the population in a given education-level age group who are still in school relative to the population. The estimation results indicate that the NER has a negative connection with poverty; as the NER at the SMA level has increased, the number of poor individuals has dropped, but the short- and long-term elasticity of the fall is minor. In addition, research indicates that the AMP at the high school level tends to drop compared to the NER at the elementary and middle school levels. In addition to diminishing, the NER at each level of the education unit tends to exhibit regional disparities due to the absence of economic equality. According to Tsaurai (2018), this scenario can disturb the education system due to the rapid human development in locations with big economic sizes.

The greater the number of high school graduates who continue their education, the higher their skill levels, which can be a prerequisite for employment. However, most of them cannot be accommodated in the regular labor market. Thus they must work in the informal sector. The value of the informal sector income coefficient for high school graduates points in a favorable direction. This scenario demonstrates that if the income

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of the informal sector for high school graduates rises, it will have a short- and long-term effect on the number of poor individuals. This situation emerges because most informal sector workers are elementary school graduates or less. Therefore, if the informal sector gives preference to high school graduates for employment, employees with elementary school diplomas or less will be excluded, leading to a rise in the number of poor individuals. In other words, when the income of informal workers rises due to a wage increase, the employment options for high school graduates and those with less than a high school diploma decrease due to increasing production input prices. According to Goings et al. (2018), to assist the poor who work in the informal sector, it is necessary to establish a minimum wage that applies to all workers, not just high school graduates, because an increase in wages, regardless of education level, increases net income, even if it results in the loss of job opportunities for others due to no increase in labor input as a result of the wage increase.

In the subsequent stage, the estimation findings indicate that the variable of vocational school graduates negatively influences poverty, implying that more vocational school graduates will reduce poverty. The increase in vocational school graduates will reduce the poverty rate by 0.43 percent over the long term. This data corroborates the findings of a study by Duarte et al. (2018), showing vocational education has the highest input-output ratio and is the most effective method for reducing poverty. In addition, agricultural labor productivity should be boosted because estimation results indicate a negative influence. In both the short- and long-term, the number of poor people will continue to shrink as agricultural labor becomes more productive. The findings of this study are comparable to those of prior research conducted in Papua by Ginting et al. (2020). However, Bellani et al. (2019)'s research indicates that agricultural labor productivity has a short-term impact on poverty reduction.

6. CONCLUSIONS

Based on the model estimation and discussion outcomes, the following significant conclusions can be drawn: 1) Public spending on education effectively reduces poverty in the Tomini Bay Area over the short and long term. 2) The average years spent in education has an elastic effect on the poverty rate. Increasing the average length of schooling in each region will speed up the short- and long-term reduction of poverty rates. The enrollment rate in high school will effectively alleviate both short- and long-term poverty. 4) Graduates of vocational schools with the necessary skills and work readiness can lessen poverty in the short and long run. 5) Even with a low level of education, agricultural labor productivity can lower the number of poor people in the short and long term. 6) The informal sector income of high school graduates has a short- and long-term impact on rising poverty rates.

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7. IMPLICATIONS

In the meantime, the contribution variables of the agricultural sector, high school labor, high school graduates, and the teacher-student ratio of vocational schools do not affect poverty in the Tomini Bay area, both in the short and long run. In this context, several recommendations must be made, including the following: 1) Public spending on education must continue to expand, with a greater emphasis on financing supporting facilities and enhancing learning support in schools. 2) Local governments must continue to promote broader access to education for all sectors of society by optimizing the existing budget, including using village funds to assist disadvantaged communities in continuing their education in rural areas. 3) Local governments must maximize high school enrollment rates and enhance the number of schools in the region so that the NER at the high school level continues to rise. 4) Vocational schools must be constructed following the area's economic structure and local potential, and their curricula must be updated to reflect the labor market. 5) Increase agricultural labor productivity by equipping workers with knowledge and skills through field school instruction. In addition, structural reforms in the economy must be accelerated so that labor does not accumulate in the agricultural sector and some labor enters the formal sector.

8. LIMITATIONS

In addition to the significant findings of this study, there are limitations. Several indices of educational performance that are not included as factors affecting the poverty rate contribute to the restrictions. To make future studies more comprehensive, the number of problems (phenomena) must be increased, and the inquiry must be conducted over a more extended period.

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