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Analysis of the Determinants of Teacher Labor Demand: An Empirical Study of Private High Schools

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Abstract

Meeting the demand for qualified teachers is a major challenge for private schools amid increasing competition and rising expectations for educational quality. This study examines the determinants of teacher demand in private senior high schools in Jambi City, Indonesia. Using quantitative methods, data were collected from 30 private senior high schools and analyzed with Ordinary Least Squares (OLS) regression. The results indicate that school finances, school productivity, school quality, and technology utilization have a significant positive effect on the demand for teachers. In contrast, teacher wages/honoraria and school facilities do not exert a statistically significant individual effect. Collectively, however, the examined variables significantly influence teacher demand, and the final regression model explains approximately 79% of the variance in teacher demand. Policy implications for meeting teacher needs in private senior high schools include: (1) enhancing the quality of academic services and graduate outcomes; (2) improving the professional and efficient deployment of teaching staff; and (3) leveraging technology to strengthen competitiveness in the education sector.

Keywords: Demand for teacher labor, Determinants of teacher employment, Private high schools

Introduction

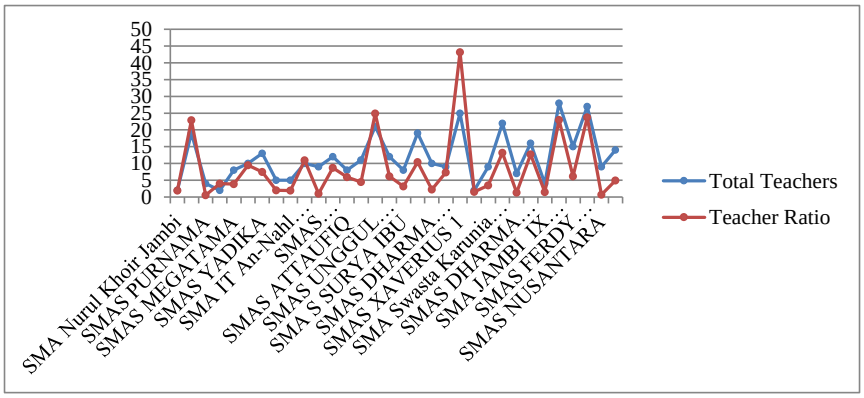
Measurement of labour demand and supply is essential in planning and implementing policies to determine the number of workers (Brinca et al., 2021), the type of workers the company needs, and the time of fulfilment (Rasdorf et al., 2016). The increase in labour demand reflects the economic strength of labour users, which is increasing or remaining the same.

The study of the labour market will form specific regions, areas, industries and the business world towards the need for labour (Shigapova et al., 2015). The study of the demand for teacher labour leads us to an in-depth analysis of the teacher labour market which will provide information about the specific needs of schools, regions or areas for teacher labour. Estimating labour demand ensures that the industry determines the supply of employee needs and plans job training according to company goals (Rasdorf et al., 2016).

Almost all researchers agree that teachers are one of the factors that greatly determine the success of student learning (Amico et al., 2017). The shortage of teachers in a school will have an impact on student learning achievement (Sutcher et al., 2016). The role of teachers becomes very important when based on student performance (Hanushek, 2020), meaning that the need for teachers depends on how much service will be provided in student learning.

The demand for teacher labour is an effort by schools to meet the needs of educational and teaching services. The work of a teacher is a form of emotional work so its fulfilment is not only based on the cognitive abilities and professional skills possessed by a teacher but must also be based on the ability to control emotions at work (Yin et al., 2016). In the work environment, teachers are directly confronted with key stakeholders, such as fellow students, administrators, and parents of students so teachers are required to be able to control unpleasant emotions in the form of expressions that are acceptable to them (Lee, 2019). The discomfort of the school environment due to the inconsistency between what the teacher feels and what is displayed causes emotional dissonance and triggers the teacher's intention to move from his profession (Steiner & Woo, 2021); (Schutz & Lee, 2014). Thus, the school environment is a very important factor in attracting teachers to work in a school.

The demand for teachers is based on the school's needs in providing educational services to students or based on the teacher-student ratio. Based on Government Regulation Number 74 of 2008 concerning Teachers, Article 17 Paragraph (1) explains that the standard ratio of teachers and students at the Senior High School level is 1:20, meaning that one teacher serves 20 students in one class. Based on this standard, the fulfilment of teacher needs in various Private Senior High Schools in Jambi City shows that the fulfilment of teacher needs does not match the needs of educational services based on the number of students, as shown in the following graph:



Graph 1. Number and Ratio of Private High School Teachers in Jambi City

Source: Dapodik kemendikbud 2024

The data shows that there are only 2 private high schools whose teacher ratio is by the number of students, and most of them, namely 25 private high schools, show a teacher ratio that is smaller than the number of teachers. There are 5 private high schools whose teacher ratio is higher than the number of teachers, meaning that the school is experiencing a shortage of teachers. The shortage of teachers has an impact on the school system, the learning process is ineffective because teachers have to teach in large classes and are not by their fields of science (Sutcher et al., 2019). The impact of teacher inequality causes learning to be ineffective, inefficient use of resources, gaps in the quality of education services, difficult opportunities to improve teacher quality, and the fulfilment of minimum mandatory teaching hours for teachers per week (Novianto & Kholid, 2020).

The problem of teacher shortages and unequal distribution in private high schools is not only locally relevant but also reflects global challenges in the teaching labor market. This phenomenon impacts equal access to education, the quality of learning, and the achievement of Sustainable Development Goals (SDG 4). Differences in subject needs (STEM vs. non-STEM), urbanization, and economic pressures exacerbate the teacher supply-demand gap. Therefore, the findings of this study have policy implications that other countries can adapt to formulate more equitable and efficient strategies for teacher recruitment, training, and distribution.

The increasing demand for teachers is due to schools reducing the student-teacher ratio, adding classes and adding study programs (Sutcher et al., 2016). Several factors influence the demand for teachers, including the student-teacher ratio, student registration, prospective teacher registration, and teacher acceptance rates (Sutcher et al., 2019). The demand for teachers is determined by compensation factors (wages), teacher pedagogical abilities, mentoring and induction, and teaching conditions (Sutcher et al., 2016). Schools with low achievement face challenges in meeting teacher needs. Naturally, working conditions, such as low salaries, large classes, occupational safety factors and inadequate facilities determine the number of teachers needed as educators in the school (Weaver et al., 2019). The need for teachers is determined by the number of subjects and the number of courses offered by the school, the number and characteristics of students, government policies related to curriculum expansion and reducing the student-to-teacher ratio (García & Weiss, 2019); (Darling-Hammond et al., 2018). Teacher shortages will impact students' learning process (Rudick & Dannels, 2020).

The imbalance between teacher supply and demand has an impact on the decline in school credibility (Darling-Hammond et al., 2018). The reduction in the number of teachers due to retirement and resignation from the teaching profession is one of the driving factors for the increase in teacher demand (Sutcher et al., 2019). The demand for teachers in public schools is determined by the level of government budget (Darling-Hammond et al., 2018). The increase in the government budget has implications for increasing the ability of schools to pay teacher salaries and other school operational costs. There is a correlation between the number of teacher supplies and the level of teacher demand, especially for Science, Technology, Engineering, and Mathematics teachers, there is a higher demand compared to social and language teachers (Cowan et al., 2016).

From various research results that have been reviewed, almost all researchers agree that what determines the number of teacher workforce is the economic factor from the supply side (Amico et al., 2017). Rationally, the principal's decision to recruit teachers is based on financial ability. This means that if the school's financial ability is high, it will need more teachers. The country's economic conditions have implications for the school budget (Sutcher et al., 2016). The extreme impact of the global economy has resulted in many students being unable to continue their higher education or dropping out of school. For private schools, the existence of students is the main source of income, so that when the number of students decreases, it will reduce the school's financial ability and have an impact on reducing the demand for teachers.

Objective(s)

The purpose of this study is to analyze the demand for teachers in private schools. To understand how private schools meet their teacher needs, a study was conducted examining influencing factors such as school finances, productivity, quality, technology utilisation, teacher wages/honorariums, and school facilities.

Conceptual Framework

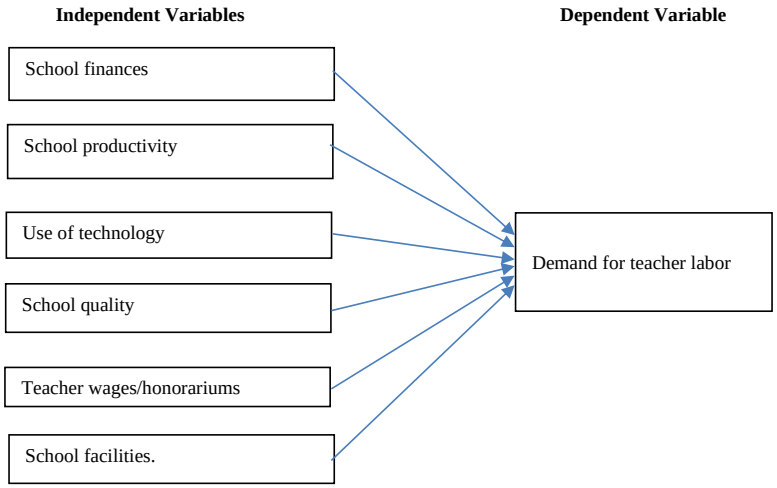


Figure 2 Conceptual Framework

Research Methodology

1. Population and Samples

To achieve the objectives of this research, a quantitative method was employed, encompassing data collection techniques, data analysis, and the interpretation of results. The study was conducted at 30 private high schools in Jambi City, out of a total of 32 schools spread across 11 sub-districts. Two schools were excluded from the study because they had only been established for two years and had not yet produced any graduates. To achieve the objectives of this research, a quantitative method was employed, encompassing data collection techniques, data analysis, and the interpretation of results. The study was conducted at 30 private high schools in Jambi City, out of a total of 32 schools spread across 11 sub-districts. Two schools were excluded from the study because they had only been established for two years and had not yet produced any graduates.

2. Research Instrument

Data were collected through a survey design using an open-ended questionnaire as the primary instrument. The questionnaire was structured according to the measurement scale of the variables studied to ensure relevance and depth of responses. The operational description of the variables and constructs is described in the following table:

Table **1 Research Data Measurement**

Variable	Indicator	Source	Measurement Scale
Teacher's Demand (D)	Number of honorary teachers teaching at schools	School Data	Ratio (Soul)
Wage/honorarium Level (W)	Hourly fee amount	Teacher salary data	Ratio (IDR)
School Quality (Q)	School Accreditation Score	Dapodik Kemendikbud or Accreditation Decree	Ordinal (Accreditation Score)
School Facilities (F)	Number of facilities owned by the school	School Data	Ratio (number of facilities)
School Finance (C)	The school's financial total is based on tuition fees and the number of students.	School Data	Ratio (IDR)
School Productivity (P)	The number of students who receive learning services	School Data	Ratio (Soul)
Technology (T)	Use of technology as a school information system	School Data	Ordinal (level of technology use)

3. Collection of Data

Data collection utilised an open-ended questionnaire to gather information on the number of teachers, school finances, school productivity, school quality, technology utilisation, teacher wages/honorariums, and school facilities. In addition to primary data, secondary data from the official website of the Indonesian Ministry of Secondary Education was used to supplement data requirements and synchronize data sourced from schools.

4. Data Analysis

Data were collected using a survey method and analyzed using multiple regression statistical techniques. The variables to be analyzed are the demand for teacher labour as the dependent variable, and the independent variables consist of salary/honorarium, school quality, school facilities, school finances, school productivity and technology.

The data were analyzed using multiple regression techniques to produce a model that will be used as a predictive tool for the influence of independent variables on the dependent variable (Uyanik & Gulur, 2013), as formulated in the following equation:

$$Log(D_l) = \alpha + \beta_1 Log(W) + \beta_2 Log(Q) + \beta_3 Log(F) + \beta_4 Log(C) + \beta_5 Log(P) + \beta_6 Log(T) + e \quad (1)$$

Where Dl is the demand for teacher labour; W is salary/honorarium; Q is school quality; F is facilities; C is financial; P is productivity; T is technology; e is the model error rate; a is a constant; b is a coefficient.

The ability test as a predictive tool for the influence of independent variables on dependent variables is based on the magnitude of the determination coefficient (Zhang, 2018); (Nakagawa et al., 2017); (Kuswanto & Anderson, 2023), which is calculated using the following formula:

$$R^2 = 1 - \frac{SSE(X)}{SSE(1_n)} \quad (2)$$

The coefficient of determination value is between 0 and 1, the closer it is to 1, the stronger the model's ability to predict the influence of independent variables on dependent variables, and vice versa.

The hypothesis is tested using t-statistics as per the following technique:

$$t_{xn} = \frac{bjx_n}{Sbjb_n} \quad (3)$$

If the t-statistic value > t-table (at alpha 5% and dk=n-1) then the hypothesis stating there is an

influence is accepted, and conversely if the t-statistic < t-table then there is not enough evidence to accept the hypothesis stating there is an influence between the independent variable and the dependent variable.
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Result

The demand for teacher labour describes the number of teacher labour used by schools to provide educational and teaching services to students at a certain honorarium/salary level. This study examines the demand for teacher labour in private high schools in Jambi City as many as 30 schools spread across 9 sub-districts. The tendency of teacher labour demand is examined from various factors that influence it, namely teacher honorarium per hour, school finances, school productivity level, school facilities, school quality, and information technology used by schools as shown in the following table:

Tabel **2 Research Data Description**

Variable	Mean	Maximum	Minimum	Skewness	Kurtosis
Teacher Labour Demand	17	37	6	0.64	3.49
Teacher's hourly salary (IDR)	37,550	100,000	15,000	1.10	3.21
Financial (IDR)	71,951,407	395,000,000	3,500,000	1.90	5.69
Productivity	184	861	23	1.93	6.72
School Facilities	14	30	5	0.44	2.44
School Quality	86	97	70	-1.04	3.30
Information Technology	3	7	1	0.85	3.26

Source: Processed primary data, 2024

Based on Table 2, there is only one variable that has a negative skewness value, namely school quality, indicating that most private high schools in Jambi City have high quality. Other variables, such as demand for teacher labor, teacher honorariums, finance, school facilities, and technology have positive skewness values indicating that most of the data are below the average value. The kurtosis value of most variables > 3 indicates that most schools have low values.

This study aims to analyze the factors that influence the demand for teacher labor consisting of wage factors (teacher wages per hour), school finances, school productivity, school facilities, school quality, and technology. To produce a good regression model as a predictive tool or Best Linear Unbiased Estimation (BLUE), normality, heteroscedasticity, multicollinearity, and linearity tests are carried out.

Normality Test Results

The normality test is conducted to determine whether the residual or interfering variable is normally distributed or not. To determine the normality of the residual, the Jarque Bera method (JB-test) is used. If the value is < chi-square probability distribution (X^2) or the probability value > alpha (5%) indicates that the residual is normally distributed. The results of the JB-test are presented in the following figure:

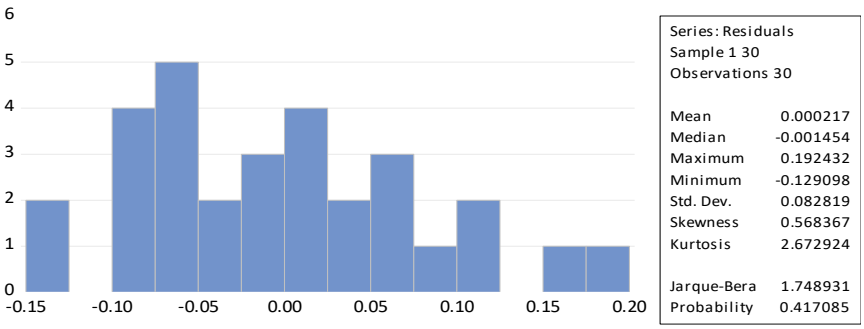


Figure 2. Data Normality Test Results

Based on Figure 2, the JB-test value is 1.75 < X^2 table of 43.77 and the probability value is 0.42 > alpha of 0.05 so that the residual is normally distributed.

Heteroscedasticity Test Results

The heteroscedasticity test is conducted to determine the similarity of residual variance from one observation to another. To determine the problem of heteroscedasticity, the Breusch Pagan Godfrey Test is conducted. If the Probability F value > alpha 5 percent indicates that there is no heteroscedasticity problem. Based on the Breusch Pagan Godfrey test, the following results are obtained:

Tabel **3 Heteroscedasticity Test Results**

F-statistic	0.685846	Prob. F(21,8)	0.7688
Obs*R-squared	19.28704	Prob. Chi-Square(21)	0.5667
Scaled explained SS	10.36248	Prob. Chi-Square(21)	0.9738

Based on Table 3, the Probability F value is 0.77 > alpha 0.05 so that there is no heteroscedasticity problem or there is a similarity in residual variance from one observation to another

Multicollinearity Test Results

A multicollinearity test is conducted to determine the relationship between independent variables in the resulting regression model. The relationship between independent variables causes multicollinearity problems if the correlation coefficient is > 0.8 - 0.9. Based on the results of the correlation test between independent variables, the following results are obtained:

Tabel **4 Correlation Between Independent Variables**

Variable	Log_C	Log_F	Log_P	Log_Q	Log_T	Log_W
Log_C	1.000	**0.578**	**0.858**	**0.345**	**0.830**	**0.637**
Log_F	0.578	1.000	**0.753**	**0.706**	**0.485**	**0.297**
Log_P	0.858	0.753	1.000	**0.623**	**0.818**	**0.595**
Log_Q	0.345	0.706	0.623	1.000	**0.319**	**0.231**
Log_T	0.830	0.485	0.818	0.319	1.000	**0.623**
Log_W	0.637	0.297	0.595	0.231	0.623	1.000

Based on Table 4, there are 3 variables that have a correlation above 0.8, namely the variables of school productivity with finance, technology with finance, and technology with productivity. The existence of a high correlation between independent variables will not cause bias and will not cause instability in the results (Lindner et al., 2020).

Linearity Test Results

A linearity test is conducted to produce a BLUE (Best Linear Unbiased Estimation) model. In this study, the linearity test uses the Ramsey reset Test. If the resulting probability value is > alpha 5 percent, it indicates that the independent variable has a linear relationship with the dependent variable. Based on the Ramsey reset test, the following results are obtained:

Tabel **5 Linearity Test Results**

	Value	df	Probability
t-statistic	1.168	23	0.255
F-statistic	1.364	(1, 23)	0.255
Likelihood ratio	1.728	1	0.189

Based on Table 5, the F-statistic probability value is 0.255 > alpha 5 percent so that the independent variables included in the model have a linear relationship with the dependent variable.

Regression Analysis Results

This study examines the influence of desert wage/honour variables (W), school finance (C), school productivity (P), school facilities (F), school quality (Q), and technology (T) on the demand for private high school teacher labour in Jambi City. Based on multiple regression analysis using logarithmic data, the following results were obtained:

Tabel **6 Regression Analysis Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_W	0.05	0.089	0.543	0.592
LOG_C	-0.13	0.059	-2.287	0.031
LOG_P	0.31	0.112	2.804	0.010
LOG_F	-0.09	0.129	-0.714	0.482
LOG_Q	0.63	0.230	2.752	0.011
LOG_T	0.48	0.136	3.526	0.002
R-squared	0.83	F-statistic		19.60
Adjusted R-squared	0.79	Prob(F-statistic)		0.00

Mathematically, the regression model can be formulated as follows:

$$\log(DL) = 0.05\log(W) - 0.13\log(C) + 0.31\log(P) - 0.09\log(F) + 0.63\log(Q) + 0.48\log(T) + e$$

or,

$$DL = W^{0.05} C^{-0.13} P^{0.31} F^{-0,09} Q^{0.63} T^{0.48} e$$

Description:

1. The teacher's wage/honour variable does not affect the demand for private high school teachers in Jambi City because the probability value produced is 0.592 > alpha of 5 percent.
2. The school financial variable has a significant effect on the demand for private high school teachers in Jambi City because the probability value produced is 0.031 < alpha of 5 percent. The coefficient of the school financial variable has a negative value of -0.13 explaining that if school finances increase by 1 percent, the demand for teacher labour will decrease by 0.13 percent.
3. The school productivity variable has a significant effect on the demand for private high school teachers in Jambi City because the probability value produced is 0.01 < alpha of 5 percent. The coefficient of the school productivity variable has a positive value of 0.31 explaining that if school productivity increases by 1 percent, the demand for teacher labour will increase by 0.31 percent.
4. The school facilities variable does not affect the demand for private high school teachers in Jambi City because the probability value produced is 0.482 > alpha of 5 percent.
5. The school quality variable has a significant effect on the demand for private high school teachers in Jambi City because the resulting probability value is 0.011 < alpha of 5 percent. The coefficient of the school quality variable has a positive value of 0.63 explaining that if the quality of the school increases by 1 percent, the demand for teacher labour will increase by 0.63 percent.
6. The technology variable has a significant effect on the demand for private high school teachers in Jambi City because the resulting probability value is 0.002 < alpha of 5 percent. The coefficient of the school productivity variable has a positive value of 0.48 explaining that if the use of school technology increases by 1 percent, the demand for teacher labour will increase by 0.48 percent.
7. Simultaneously, the variables of wages/honorarium (W), school finance (C), school productivity (P), school facilities (F), school quality (Q), and technology (T) have a significant effect on the demand for private high school teachers in Jambi City because the resulting F-Statistic probability value is 0.00 < alpha of 5 percent.
8. The resulting model has a capability of 79 percent in predicting the influence of desert wages/honours (W), school finances (C), school productivity (P), school facilities (F), school quality (Q), and technology (T) on the demand for private high school teacher labour in Jambi City.

Discussion

This study statistically analyzes the factors that influence the demand for private high school teachers in Jambi City, namely teacher wages/honours, school finances, school productivity, school facilities, school quality, and technology. The results of the analysis show that two variables do not have a significant effect, namely teacher wages/honours and school facilities. Thus, the discussion is only focused on factors that significantly influence the demand for teacher labour.

1. The Influence of School Finances on the Demand for Private High School Teachers in Jambi City

Finance is a very important aspect for schools in organizing learning activities. Financial availability ensures that schools can meet the needs of teachers, education personnel (employees), learning facilities, and other school operational costs (Sung & CHoi, 2014). The dilemma of private schools is faced with the demands of large needs but limited financial provision. Schools that have limited financial resources will tend to have difficulty in providing educational services to students, both through facility services, teacher learning and guidance, and school administration services. Facing this dilemma requires schools to be efficient in using existing resources.

The results of this study reveal a significant negative influence of school financial variables on the demand for private high school teachers in Jambi City. These results explain the phenomenon that schools with high finances tend to use fewer teachers in providing educational services to students. This fact can be understood because schools with high finances try to make use of teachers more efficiently in providing educational services to students, namely with a certain number of teachers they can provide maximum educational services or with a minimum number of teachers they can provide certain educational services. This fact is also explained in the study (Rhomadhani et al., 2021) there is a tendency for quality private schools in Jambi City to be more efficient in using their resources, especially the use of teachers. Optimizing teacher performance in providing educational services will result in a greater workload, which will increase teacher income (Wolf et al., 2015). Thus, the fewer the number of teachers, the greater the average income generated by each teacher. This condition strengthens the preference of teachers to continue working at the school. A different trend occurs in rural schools. Schools with low financial resources face fewer teacher demands compared to schools with high financial resources (Nguyen, 2020).

2. The Influence of School Productivity on the Demand for Private High School Teachers in Jambi City

School productivity describes the number of educational services provided by schools to stakeholders, especially students. School productivity is determined by the number of students who need educational services at the school. Thus, the greater the number of students, the greater the need for teachers. Educational services in schools are not only in the form of classroom learning but also include extracurricular activities, practicums, internships, and training so the development of these programs will increasingly require teachers. The results of this study indicate a positive influence of school productivity variables on the demand for private high school teachers in Jambi City. Schools with high productivity provide more teaching hours so they need more teachers (Britton & Propper, 2016). Industries that have a high level of productivity will have more working hours available to run the production process so they increasingly need more workers (Basu & Bundick, 2012). This study is the basis for private schools in adding workers to take into account industry growth, labour productivity, and investment (Shigapova et al., 2015). This is very important because the growth of industrial productivity will indirectly increase final demand and increase income. Where increasing industrial capacity requires more and more workers (Autor & Salomons, 2018).

3. The Influence of School Quality on the Demand for Private High School Teachers in Jambi City

School quality is indicated by the availability of adequate teaching materials and equipment, safe and clean facilities, standard student-teacher ratios, and adequate personnel (teachers and administrators). The results of this study reveal that school facilities have a positive effect on the demand for teacher labour. This result can be understood if the facilities owned by the school are more complete, more teachers will be needed as supporting staff in functioning the facilities. On the other hand, the availability of school facilities will provide teachers with comfort in providing educational services to students. Quality services will motivate students to utilize school facilities and optimize learning activities (Kuswanto & Anderson, 2021). Uncomfortable conditions will have an impact on teacher retention rates and reduce teacher turnover (Podolsky et al., 2016).

Indirectly, quality schools will be in demand by the community as a place of education for their children so more teachers will be needed to accommodate the improvement of educational services. The increase in demand for teachers is prioritized by qualified teachers who have special competencies to improve educational services and maintain the school's reputation. This domino effect must be understood by private schools so that they continue to exist as educational institutions that are in demand by the community. Schools that provide services to students to achieve good learning achievements have a large demand for teachers

(Engel et al., 2014).

4. The Influence of Educational Technology on the Demand for Private High School Teachers in Jambi City

Technology is very much needed by schools to support educational services. Some of these technologies are applications that can be accessed to facilitate new student registration, teacher recruitment, tuition payments, teacher salary payments, school data storage, e-learning, and reporting of learning outcomes. The existence of technology in school management can function as a complement and as a substitute for teacher labour. The results of this study indicate that the technology used by schools has a positive effect on the demand for teacher labour, meaning that the higher the use of technology in providing educational services, the more teachers will be needed. Schools with high technology use will need more teachers to operate the technology. Technological developments increase the relative demand for skilled labour (Meschi et al., 2016). The expansion of company production requires more workers from both white-collar (skilled labour) and blue-collar (unskilled labour).

The use of technology has an impact on changes in computerized work systems requires cognitive and interpersonal skills for professionals and managers and reduces the demand for analytical and mechanical skills (Boustan et al., 2022). The presence of new technology will shift the tasks of production functions, resulting in changes in productivity and demand for labour (Acemoglu & Restrepo, 2019). Several assumptions about the impact of technology on labour demand, first the use of technology can reduce the demand for labour because the productivity resulting from labour migration is very low; second, labour migration does not always increase wages commensurate with increased productivity. The substitution effect of technology use on labour use will reduce labour demand, and the complementary effect of technology use on labour use will increase labour demand.

In general, technological advances increase employment opportunities, but on the other hand have an impact on reducing the added value of labour because the role of technology replaces labours (Autor & Salomons, 2018). The use of technology on the one hand can increase productivity but on the other hand has an impact on reducing the workforce (Brynjolfsson & Mitchell, 2017).

Suggestion

The study found that demand for teacher labour in private senior high schools in Jambi City varied between a maximum of 37 teachers and a minimum of 6 teachers, with most schools exhibiting demand below the sample mean. Regression results indicate that school productivity, school quality, and technology utilization have positive and statistically significant effects on teacher demand. Conversely, school financial capacity shows a negative effect on teacher demand, suggesting better-financed schools tend to use teacher labour more efficiently and therefore do not necessarily require more teachers as finances improve. Teacher wages/honoraria and school facilities were not significant in partial tests, although the variables collectively have a significant effect; the regression model explains 79% of the variation in teacher demand, with the remaining 21% attributable to factors outside the model.

The findings have several policy implications for private school managers and education policymakers. Improving academic quality and graduate outcomes should be prioritized because higher-quality schools attract greater community demand, which can increase revenue and the school's capacity to meet teacher needs. Promoting efficient deployment of teacher labour while maintaining professionalism is recommended, for example organizing curricula so that appropriately qualified teachers can cover related subjects and extend instructional hours without compromising teaching standards, thereby increasing per teacher earnings and retention. Prioritizing technology adoption and capacity building is essential, since technology expands access and supports service delivery, but higher levels of technology use also raise demand for staff capable of operating and integrating these tools; complementary policies such as teacher training, competency incentives, and targeted budget allocations for technology are therefore needed.

This study's main limitation is its narrow geographic scope, as data were collected from 30 schools within a single city, so generalization to other regions should be made with caution. Future research should expand the sample across multiple districts or provinces and include additional variables that may account for the unexplained 21% of variation (for example, student demographics, regional education policies, or local labour market dynamics). Longitudinal designs are also recommended to establish causal relationships and to examine how teacher demand evolves in response to changes in school finance, efficiency measures, and technology adoption.

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