

# Unit Cost Analysis Using the Activity Based Costing (ABC) Method on the Competence of Vocational Welding Engineering Expertise

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## ABSTRACT

This study aims to (1) Analyze the actual unit cost value for the competence of Vocational High Schools (SMK) welding engineering expertise using conventional calculation methods. (2) Analyze the actual unit cost value for SMK welding technique expertise competence with the Activity Based Costing (ABC) method. (3) Analyze the ideal unit cost value for vocational welding engineering expertise competence. (4) Analyze the effectiveness of education budget management in the learning process of SMK Welding Engineering.

The research used is a mixed type that uses a sequential exploratory model. In the first stage, qualitative methods are followed by quantitative methods, emphasizing quantitative methods. Qualitative methods at the beginning classify school operating costs and identify school activities and resources that incur costs for school activities, while the quantitative method for calculating the unit cost of education uses the Activity Based Costing (ABC) approach. This study aims to determine how much each student costs yearly to learn welding engineering skills. This research was carried out at SMKN 1 Tanjunganom Nganjuk, the only State Vocational School with the status of SMK Center of Excellence in Welding Engineering Expertise Competencies.

The study results are as follows: (1) The calculated unit costs/real unit costs per year per welding engineering student based on conventional calculations at SMKN 1 Tanjunganom are Rp. 3,593,558. (2) The calculated unit costs/real unit costs per year per welding engineering student at SMKN 1 Tanjunganom, based on the Activity-Based Costing (ABC) method, are Rp. 4,242,686 for class X, Rp. 4,203,831 for class XI, and Rp. 4,861,468 for class XII. (3) Rp is The calculated ideal unit cost per year per welding engineering student at SMKN 1 Tanjunganom based on the curriculum and RKAS. 4,512,200 for class X, Rp. 5,496,771 for class XI, and Rp. 5,506,018 for class XII. (4) The effectiveness of using the education budget in the welding engineering e-learning process at SMKN 1 Anjunganom can meet the learning objectives of SMK, which can prepare students to enter the workforce as much as 35% or 71 students; continuing to higher education as much as 15% or 30 students; and able to choose jobs, compete and develop themselves 50% or 101 students out of a total of 203 welding engineering students in 2023.

**Keywords:** unit cost, activity-based costing, vocational high schools, welding

## INTRODUCTION

Education cannot be separated from aspects of theory and practice in its implementation; theory is related to concepts and principles related to a scientific discipline or subject, while practice is associated with applying theory in everyday life. Theoretical learning is held in the classroom, while practical learning is held in practical workshops (Thomas, 2015). Based on Law no. 20 of 2003 concerning the National Education System, The third part of Secondary Education Article 18 paragraph 3 states that "Secondary education takes the form of Senior High School (SMA), Madrasah Aliyah (MA), Vocational High School (SMK), and Vocational Madrasah Aliyah (MAK), or other equivalent forms." Senior High Schools (SMA) and Vocational High

Schools (SMK) both have different teaching portions, in general, between theory and practice. High school prepares students to enter university so that learning focuses more on theory than practice. Meanwhile, vocational schools place more emphasis on practical aspects (Asmoni, 2008).

The differences mentioned above will directly affect the amount of funding schools must spend; the implementation of vocational education is generally assumed to require more significant costs than general education (Klein, 2001). Unit cost analysis of practical materials for vocational school students is a study to determine the costs required for learning activities at vocational schools. This analysis was carried out by considering the costs incurred by the school to purchase, store, and manage practical materials students use in the learning process at vocational schools. The Welding Engineering Skills Competency (TPL) is one of 146 skills competencies developed in Vocational Schools based on the Director General of Primary and Secondary Education Regulation of the Ministry of Education and Culture Number 06/D.D5/KK/2018. Welding Engineering is one of the majors in vocational schools that requires substantial funding compared to other majors. Therefore, unit cost calculations are needed so that learning can be in line with curriculum learning outcomes. Based on initial observations, it was found that the school had never calculated the actual and ideal needs/expenditures per student per year.

## LITERATURE REVIEW

### Vocational Education

Based on the explanation above, Vocational High School is a form of vocational education at the secondary school level. It has the task of equipping students with specific competencies and preparing graduates to compete in work or the industrial world. The large portion of practical activities in learning requires a more detailed calculation of vocational education costs so that all learning activities can be carried out well and according to the applicable curriculum. Vocational education is synonymous with "how to work" learning, aims to improve a person's technical competence and position in the environment through mastery of technology, and is closely related to job market needs. As a result, it is often considered a significant contributor to the national economy (Henry & Thomson, 2002). Vocational education, broadly, includes all types and forms of learning experiences that help students navigate the stages of vocational development, starting from identification, exploration, orientation, preparation, selection, and consolidation of careers in the world of work (Sukanto, 2001). Costs are all funds for running a school, both directly and indirectly, obtained from the government, community, and parents (Syaiful Sagala, 2007). Unit costs per student are derived from the total expenses divided by the number of students in the school during a specific period (Nanang Fattah, 2009.) explains that "unit costs" refers to the amount each student spends on routine expenses in one academic year. The term "unit cost" refers to the annual tuition fee for one student at a certain educational level (Matin, 2013); activity Costing (ABC) is a measurement of the cost of a product or service which is based on the sum of the costs (cost accumulation) of the activities or activities that arise in connection with the production or service (Witjaksono, 2003). Activity-based Costing (ABC) is a cost calculation method that identifies, measures, and allocates costs based on activities carried out in the organization. ABC focuses on the use of resources and relates costs to the activities performed in producing a product or service (Kaplan & Cooper, 1998).

### Unit Cost of Education

Nanang Fattah (2009:26) defines unit costs per student as costs that come from the total expenses divided by the total number of students in the school during a specific period. Meanwhile, Matin (2013: 160–161) explains that "unit costs" refers to the amount each student spends on routine expenses in one academic year. The term "unit fee" refers to the annual tuition for one student at a particular educational level.

Agus Irianto (2013: 159) revealed that the average cost of providing education in schools per student per fiscal year is called the unit education cost. These costs vary depending on the amount of funds/costs spent by the

school plus the total number of students. Dividing the total school costs by the number of students determines the unit cost.

### **Activity Based Costing (ABC)**

Understanding the Activity-Based Costing Method According to Kaplan and Cooper (1998), Activity-Based Costing (ABC) is a cost calculation method that identifies, measures, and allocates costs based on organizational activities. ABC focuses on resource use and relates costs to producing a product or service.

## **METHODOLOGY**

This research is a mixed type that uses a sequential exploratory model. In the first stage, qualitative methods were used, followed by quantitative methods, emphasizing quantitative methods. The initial qualitative method classifies school operational costs. It identifies school activities and resources that generate costs for school activities, while the quantitative method calculates the unit cost of education using a method approach. *Activity-Based Costing* (ABC). This research aims to determine how much each student costs yearly to learn welding engineering skills.

### **Research Subjects**

This research will be carried out at SMKN 1 Tanjunganom Nganjuk in the Welding Engineering skills competency, and the research implementation time is from August 2023 to October 2023. Furthermore, November and December 2023 will be used to analyze research data

### **Data Collection Instruments and Techniques**

The instruments used were interview guides and documentation, while qualitative data collection techniques were carried out through in-depth interviews and document study. Detailed interviews were conducted with the Principal, teachers, officers appointed by the Principal to keep the School Activity Plan and Budget (RKAS) documents, and the school treasurer. Data collection in quantitative research comes from data processed in the previous stage.

### **Data analysis**

Data analysis with approaches *Activity Based Costing* (ABC) is widely used in unit cost calculations, especially in sequential exploratory research, namely qualitative and quantitative analysis carried out sequentially. Qualitative data helps provide context and a deeper understanding of the factors that influence costs, while quantitative data is used for cost and unit cost calculations. This approach allows researchers to gain more comprehensive and in-depth insight into the actual cost structure and unit costs. The qualitative data analysis used by researchers is interactive model data analysis (Miles, Huberman & Saldana. 2014), while quantitative data analysis uses the Activity Costing method referring to the theory of Hansen & Mowen (2009)

## **RESULTS AND DISCUSSION**

### **Result**

Using conventional calculation methods, analyze the actual unit cost value for SMK welding engineering skills competency.

Based on the 2022 financial report of the school treasurer of SMKN 1 Tanjunganom, the school expenditure data is as follows:

Table 1. Total School Expenditure

Number of Students	School Expenditures 2022		Total
	Odd Semester	Even Semester	
1259 siswa	Rp. 2.157.200.000	Rp. 2.367.090.000	Rp. 4.524.290.000

From this data, the cost of education units per year per student for all skill programs can be calculated with the following formula:

$$\begin{aligned}
 Sb. (s,t) &= K(s,t) : M(s,t) \\
 &= Rp. 4.524.290.000 : 1259 \\
 &= Rp. 3.593.558
 \end{aligned}$$

Description:

Sb = unit cost per student per year

K = total school expenses

M = number of students

S = SMKN 1 Tanjunganom

t = year 2022

The calculation results obtained the unit cost per student per year for all expertise programs at SMKN 1 Tanjunganom of Rp. 3,593,558

### Analyzing the actual unit cost value using the Activity Based Costing (ABC) method

The calculation of the unit cost per student per year in the Welding Engineering expertise competency of SMKN 1 Tanjunganom using the ABC method will be carried out in 5 stages as follows:

Table 2. Results of the Direct Cost Calculation of the TPL Expertise Program SMKN 1 Tanjunganom for the 2023/2024 Academic Year

Number	Types of Activities	Grade		
		Grade X	Grade XI	Grade XII
1	Direct Costs	Rp 1.735.915	Rp 1.697.060	Rp 2.354.697
2	Indirect Costs	Rp 2.506.771	Rp 2.506.771	Rp 2.506.771
	<b>TOTAL</b>	<b>Rp 4.242.686</b>	<b>Rp 4.203.831</b>	<b>Rp 4.861.468</b>

Based on these results, the amount of education cost per student per year, or the unit cost of the Welding Engineering (TPL) expertise program of SMKN 1 Tanjunganom with details of the amount, is for class X of Rp. 4,242,686, class XI of Rp. 4,203,831 and class XII of Rp. 4,861,468

### Analyzing the ideal unit cost value for vocational welding engineering expertise competencies

The calculation of the ideal unit cost on the competence of welding engineering expertise at SMKN 1 Tanjunganom uses RKAS data from the Department of Welding Engineering, which contains the need for the

practice of welding engineering students in the next 1 year. The RKAS was prepared by a team of productive teachers of welding techniques with the following details:

Table 3. Results of Calculation of Ideal Unit Cost Value

Number	Types of Activities	Grade		
		Grade X	Grade XI	Grade XII
1	Direct Costs	Rp 2.005.429	Rp 2.990.000	Rp 2.999.247
2	Indirect Costs	Rp 2.506.771	Rp 2.506.771	Rp 2.506.771
	<b>TOTAL</b>	<b>Rp 4.512.200</b>	<b>Rp 5.496.771</b>	<b>Rp 5.506.018</b>

Calculating the ideal unit cost based on the Welding Engineering RKAS results in Rp. 4,512,200 per student per year for class X, Rp. 5,496,771 per student per year for class XI, and Rp. 5,506,018 per student per year for class XII.

### The effectiveness of education budget management in the process of learning welding techniques

The second stage of the qualitative research involved in-depth interviews with SMK management respondents, including school principals, deputy principals for public relations and human resources (HR), heads of expertise programs, deputy principals for infrastructure, school treasurers, and productive teachers.

School financial management, SMKN 1 Tanjunganom, has three school treasurers based on existing sources of funds, namely the BOS treasurer, the BPOPP treasurer, and the committee treasurer. The three treasurers are responsible for handling each source of funds. From planning and implementation to reporting in the form of school financial responsibility reports, this Treasurer has duties and responsibilities in managing school finances, recording financial activities, and reporting them in the form of school financial accountability reports. School financial activities are not always the same as those of RKAS. The Treasurer manages the school's finances based on RKAS and deliberations with the Principal. Tuition payments from parents of students in arrears are still the main problem in school finances. This causes several problems, such as delays in employee salaries and delays in purchasing practicum needs.

The role of the Principal as a supervisor and financial assessor of the school is the most important. The Treasurer uses funds for school expenses with the approval of the Principal. Thus, the Principal knows and controls every financial activity of the school. In addition to the Principal, supervision activities are also carried out by vocational school supervisors appointed by the Education Office. The supervision results are then used as evaluation material for school financial management in the upcoming school year. Based on this, the effectiveness of the use of the education budget in the learning process of welding techniques at SMKN 1 Tanjunganom can meet the learning objectives of SMK, namely being able to prepare students/students to enter the workforce as many as 35% or 71 students; continuing to a higher level of education as many as 15% or 30 students; and able to choose a job, compete and develop themselves 50% or 101 students out of a total of 203 students.

## DISCUSSION

Based on financial management in schools used as the object of this research, there are still some shortcomings and cannot be said to meet all the principles of educational financial management. The results of calculating the actual unit cost of education with the conventional method and Activity Based Costing (ABC) are still above the ideal unit cost, which is also calculated using the Activity Based Costing (ABC) method. The following is a comparison table of the calculation of unit costs for welding engineering competency students at SMKN 1 Tanjunganom using conventional and ABC approaches.

Table 4. Results of the recapitulation of the unit cost comparison

Grade	Unit cost		
	Conventional	ABC	Ideal
X	Rp 3.593.558	Rp 4.242.686	Rp 4.512.200
XI	Rp 3.593.558	Rp 4.203.831	Rp 5.496.771
XII	Rp 3.593.558	Rp 4.861.468	Rp 5.506.018

Based on the comparison table above, the conventional unit cost determination with the Activity-Based Costing (ABC) approach is also still below the cost of the educational unit calculated by the Ideal calculation. This difference is because the calculation with the ABC approach is based on the cost needs of each activity in a particular school year, which becomes more detailed. In this regard, the calculation results with the ABC approach can help schools determine the amount of education cost sources that meet the principle of fairness. In addition to being fair, the fees obtained certainly meet the needs of school fees in carrying out all its activities.

## CONCLUSION

Based on the calculation results of the unit cost per year per student of the Welding Engineering Expertise Program (TPL) of SMKN 1 Tanjunganom, the following conclusions can be drawn:

1. The calculation results of the real unit cost per year per welding engineering student based on conventional calculations at SMKN 1 Tanjunganom are Rp. 3,593,558. This amount is obtained by charging the amount of school expenses in the 2022/2023 school year to all students in that school year. Hasil perhitungan biaya satuan/unit cost riil per tahun per siswa teknik pengelasan SMKN 1 Tanjunganom berdasarkan metode Activity Based Costing (ABC) besarnya yaitu untuk kelas X sebesar Rp. 4.242.686, kelas XI sebesar Rp. 4.203.831 dan kelas XII sebesar Rp. 4.861.468
2. The results of calculating the ideal unit cost per year per welding engineering student at SMKN 1 Tanjunganom based on the Curriculum and RKAS are as follows: class X: Rp. 4,512,200 per student per year; class XI: Rp. 5,496,771 per student per year; and class XII: Rp. 5,506,018 per student per year.
3. Based on the effectiveness of the use of the education budget in the welding engineering learning process at SMKN 1 Tanjunganom, it can meet the objectives of vocational high school learning, namely being able to prepare students to enter the workforce as many as 35% or 71 students; continuing to a higher level of education as many as 15% or 30 students; and being able to choose jobs, compete and develop themselves 50% or 101 students from a total of 203 welding engineering students in the 2023 graduation year.

## RECOMMENDATIONS

Based on the research results that have been obtained, researchers provide suggestions to several parties as follows:

### School

Based on the results of this research, vocational schools can, it is hoped, use the Activity Costing (ABC) approach to determine the amount of operational costs per year per student. This will allow them to obtain more detailed information on cost requirements and, more precisely, calculate the need for educational cost sources other than the government.

## Government

The results of this research can be used as study material by the government to determine the amount of operational assistance funds for Vocational High Schools.

## Society

The information provided from the results of this research will make the public aware that the costs required for the teaching and learning process in vocational schools are indeed high. Parents and stakeholders are expected to increase their support for the teaching and learning process and all forms of resources supporting school activities' implementation. It can be done by increasing awareness of paying education costs for students' parents and assisting the community.

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