

# Feasibility Analysis of Wood Workshop Facilities and Infrastructure of Construction and Property Engineering Expertise Program in SMKN 1 Percut Sei Tuan

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**Abstract.** The aim of this research is to determine the suitability of the wood workshop space, completeness of wood working equipment and furniture, wood workshop lighting system at SMK Negeri 1 Percut Sei Tuan based on the standards required by Minister of National Education Regulation No. 34 of 2018, guide to vocational school facilities and infrastructure and SNI 03-6575-2001. This is done to provide comfort for students and teachers who will use the wood workshop. This research is a type of research with an evaluative descriptive method. The subject of this research is SMK Negeri 1 Percut Sei Tuan, especially the wood workshop, while the research object is the space, lighting system equipment and furniture, wood workshop, Construction Engineering and Wood Property Skills Program at SMK Negeri 1 Percut Sei Tuan. Data collection methods include interviews, observation and documentation. The data analysis technique was carried out using quantitative methods, namely comparing research data at SMK Negeri 1 Percut Sei Tuan with existing standards, and supported by the results of field observations. The results of this research are (1) the area of the wood work space in the SMK 1 Percut Sei Tuan wood workshop meets the standards, namely 252 m<sup>2</sup>, almost reaching the standard size of 256 m<sup>2</sup> with an achievement percentage of 98.8%, the area of the storage space and wood workshop instructors of SMK Negeri 1 Percut Sei Tuan meets the standard, namely 74.25 m<sup>2</sup>, larger than the standard size of 48 m<sup>2</sup> with an achievement percentage of 154.6%, the total area of the woodworking workshop at SMK Negeri 1 Percut Sei Tuan meets the standard, namely 393.25 m<sup>2</sup>, larger than the standard size. 304 m<sup>2</sup> with an achievement percentage of 129.3%; (2) the wood workshop equipment and furniture meet the standards with the number of hand tools there being 3 types of tools that meet the standards and 12 types of tools that do not meet the standards, tools working station double there are 3 types of tools that meet the standards and 5 types of tools that do not meet the standards; 3 types of equipment meet standards, 7 types of furniture meet standards and 1 type of furniture does not meet standards. (3) lighting in the woodworking workshop meets standards, namely in the morning 510.6 lux, in the afternoon 609 lux, and in the evening 576.6 lux. The completeness of the wood workshop infrastructure significantly influences students' competency scores.

**Keywords:** wood workshop, area, lighting, equipment, furniture, student competency.

## **1 Introduction**

SMK Negeri 1 Percut Sei Tuan is a formal educational institution which has several skill programs including the Construction and Property Engineering skills program, where graduates are expected to be able to compete in the business world, especially in the field of Construction and Property engineering in accordance with the aims of the SMK to realize these hopes, at SMK Negeri 1 Percut Sei Tuan equips students with productive subjects to support the achievement of quality graduates, one of which is Creative Products and Entrepreneurship subjects. Facilities and infrastructure have an important influence on the success of the learning process at school. Means are everything that can be used as a tool to carry out activities. Based on the Minister of National Education Regulation no. 40 of 2008 concerning standards of facilities and infrastructure intended for Vocational High Schools (SMK)/Vocational Madrasah Aliyah (MAK) article 4 reads "The administration of SMK/MAK is obliged to implement standards for SMK/MAK facilities and infrastructure as regulated in this Ministerial Regulation, no later than 5 (five) years after this Ministerial Regulation is stipulated." The regulation explains that all educational units are required to have the necessary facilities and infrastructure. So, it is hoped that in implementing learning, schools will be able to complete the facilities and infrastructure needed by students in order to create superior and professional graduates and improve the quality of education better (Aqzanul, 2020).

According to the results of initial observations at the SMK Negeri 1 Percut Sei Tuan workshop located at Jl. Pool no. 3 Medan Estate, District. Percut sei sir, Kab. Deli Serdang, North Sumatra. The State Vocational School 1 Percut Sei Tuan itself was officially established in 1955 and underwent several school name changes over time, including: Technical Education Teachers' School from 1955 - 1964, Instructor Stm from 1964 - 1971, State 4 Medan State Vocational School from 1955 - 1964. 1971 – 1997, SMK Negeri 1 Percut Sei Tuan 1997 – present. The woodworking workshop building at SMK Negeri 1 Percut Sei Tuan was originally built in 1975. The aim of the workshop is to facilitate and increase students' knowledge and creativity in learning wood and property practices. Over time, the wood workshop building at SMK Negeri 1 Percut Sei Tuan underwent several renovations and repairs to meet the growing educational needs. Currently, the building still stands strong and is one of the characteristics of SMK Negeri 1 Percut Sei Tuan.

The SMK N 1 Percut Sei Tuan woodworking workshop has a machine work area and a hand work area, the workshop also has a storage room for equipment and materials, a study room, also has an instructor room, has a student work storage room or warehouse, and is also equipped with a toilet. This wood workshop is located in the south and east of SMK Negeri 1 Percut Sei Tuan. To the south of the woodworking workshop is the boundary fence of SMK Negeri 1 Percut Sei Tuan. To the north it borders an automotive repair shop. Meanwhile, to the east it borders the student motorbike parking lot and the school canteen. There are 3 classes with a total of 91 students in 1 semester that use the woodworking workshop for practice on the subjects of creative products and entrepreneurship. Researchers are interested in observing, collecting data, and analyzing workshop users' perceptions of this.

### **1.1 Wood Workshop Qualifications**

According to Edi Trianto (2008: 35) feasibility has the meaning of the word appropriate or good. A research is considered feasible if there are certain criteria in the research process. The criteria

are used as a comparison for the data obtained. From the results of this comparison and based on the suitability of the data with the criteria, decision making can be determined (Amin, 2009:60). The criteria for determining whether or not the facilities and infrastructure for a school are appropriate refer to Permendiknas No. 34 of 2018. Facilities and infrastructure will be considered adequate if the condition, number and function of the facilities and infrastructure are in accordance with Permendiknas No. 34 of 2018. If the condition, number and function of facilities and infrastructure do not comply with Permendiknas No. 34 of 2018 means that facilities and infrastructure are considered inadequate.

## **1.2 Wood Workshop Room**

Space is a container for human activities, both activities for physical needs and human emotions. Meanwhile, a workshop is a place used for practical activities, for skills training, for efforts to realize teaching in various types (specializations) of work. According to Husaini Usman & Purnomo Setia Akbar (2000), space quality requirements consist of general requirements and special requirements. General requirements are requirements that generally must be developed according to local environmental circumstances and conditions. Special requirements are requirements that contain size standards as a guide for the procurement of space facilities. Every place and every job certainly has procedures for carrying out activities. According to experts, there are several meanings or definitions regarding standard operating procedures (SOP), SOP is a guide or reference used to ensure operational activities run smoothly (Sailendra Annie, 2015). The minimum standards that practitioners must apply when using a Woodworking Workshop are as follows. 1. Know the work to be done and its stages. 2. Entering the workshop complete with personal protective equipment. 3. Carry out work carefully, thoroughly and thoroughly according to existing work steps. 4. Don't disturb each other or joke while doing work. 5. Do not operate the tool if you do not fully understand how to operate it. 6. Immediately carry out first aid if a work accident occurs. And also the workshop offers adaptability based on the minimum room size required, taking into account its function, floor layout, ergonomics and occupational health and safety requirements (Darmono et al., 2021).

Ministerial Regulation No. 34 of 2018 contains various regulations regarding standards of facilities and infrastructure that must be met in every department in every SMK/MAK educational institution in general. The following is data on standard facilities and infrastructure for practice rooms/wood workshops according to Minister of National Education Regulation No. 34 of 2018: a. The practice room for the Wood Construction Engineering Skills Program functions as a place where learning activities take place: basic work/hand wood work, carpentry, basic building construction work, space partition construction, and wood construction. b. The minimum area of the practice room for the Wood Construction Engineering Skills Program is 304 m<sup>2</sup> to accommodate 32 students, which includes: 128 m<sup>2</sup> wood-hand work area, 64 m<sup>2</sup> wood machine work area, 64 m<sup>2</sup> wood construction work area, storage and instructor room.

## **1.3 Workshop Equipment**

Tools are means used to process, check, observing, testing, making, measuring, checking, dismantling, installing, etc. of an object so as to obtain the desired results, whether in the form of finished goods, reading numbers, indicators, or a certain conclusion. The tools in school workshops are mostly hardware or tools in the form of hardware, while the ones in the form of software are relatively small. As stated by Afandi (2007: 28), classifying practical facilities

according to type into three types: 1) the main equipment is a tool/machine which is a place for students to learn one or several skills/ skill (usually called working station), 2) standard equipment is the completeness of a piece of equipment which is as much as the main equipment, 3) additional equipment is the completeness of a piece of equipment which is not as much as the main equipment.

#### **1.4 Lighting**

Light is an absolute requirement for humans to see the world. Without light, the world would be dark, black and scary. Beauty will not be seen and enjoyed. Humans need light to carry out healthy, comfortable and enjoyable activities. Without light there is no architecture. (Satwiko, 2004). Lighting is divided into two, namely natural lighting and artificial lighting. Natural lighting is lighting that uses direct sunlight in the morning and afternoon or is often known as a plate solar system, namely the design of the building itself must make it easy to collect and store solar energy and at a small additional cost, (James C. Snyder & Anthony J. Catanese, 1996). Natural lighting can be obtained from sunlight through ventilation or openings in the building. The sun is the easiest source of natural light or lighting to obtain and has many benefits. Therefore, it must be utilized as much as possible.

## **2 Methodology**

The research method used is an evaluative method which uses an evaluation model and is goal-oriented to find out whether the types of housing units for low-income people have implemented the criteria of the Indonesian Tropical Architecture concept. The benchmarks used in this research are scientific theories, government regulations, and standards that describe the standards of facilities and infrastructure for vocational school woodworking workshops. The use of evaluative descriptive research methods is based on the main research objective, namely trying to describe the situation comprehensively in the actual context (Sugiyono, 2006) The evaluative description was done by relating to the evaluation of the implementation of the criteria for facilities and infrastructure of the SMK Negeri 1 Percut Sei Tuan woodworking workshop.

In this research, the researcher took the location at SMK Negeri 1 Percut Sei Tuan by taking the Construction and Property Engineering skills program. The research period is from November to December 2023 with the research stages, namely: 1) literature review and field survey, 2) making a proposal, 3) data collection, 4) data analysis and 5) preparing a research report. In this research, what is meant by population is all the facilities and infrastructure in the wood workshop of the Construction and Property Skills Program at SMK Negeri 1 Percut Sei Tuan. And the research sample includes room area, number and completeness of equipment, lighting and ventilation.

The research design aims to provide clear and structured guidance to researchers in conducting their research. The stages of this research design are: 1) observation, 2) literature review, 3) research methods, 4) data collection, 5) data processing, 6) data interpretation and analysis, 7) Conclusion of research results.

### 3 Result and Discussion

#### 3.1 Spatial conditions of the workshop space

It is known that SMK N 1 Percut Sei Tuan has 8 areas in the woodworking workshop. There is a work desk area, a sitting machine area, 2 instructor rooms, an equipment room, and a theory room as well as a product room. The following are the dimensions of each room in the woodworking workshop of the SMK N 1 Percut Sei Tuan wood construction skills program:

**Table 1.** The dimensions of each room.

no	Room name	Size (m)			wide
		long	wide	Height	
1	Work area	22 m	11,5 m	4 m	253 m <sup>2</sup>
2	Storage space	8,5 m	4,5 m	4 m	38,25 m <sup>2</sup>
3	Instructor's room	8 m	4,5 m	4 m	36 m <sup>2</sup>
4	Workshop headroom	6 m	3,5 m	4 m	21 m <sup>2</sup>
5	Theory space	7,5 m	6 m	4 m	45 m <sup>2</sup>
Total area of the room					393,25 m <sup>2</sup>

To determine the feasibility of this wood workshop space in table 4.1 based on data analysis using a percentage scale, with the formula below:

$$condition = \frac{Field\ Size}{Standard\ Quantity} \times 100\%$$

Percentage of attainment of the standard area of wood workshop space based on Minister of National Education regulation no. 34 of 2018 with the area at SMK N 1 Percut Sei Tuan being.

- The percentage of work area achievement for 32 students with a standard area was 98.8%, meeting the standard.
- Percentage of achievement of storage area, and instructor  
Spacious storage space 38,25m<sup>2</sup>, spacious instructor room 36m<sup>2</sup>, total area 74,25m<sup>2</sup>. The results obtained were 154.6%, meeting the standards.
- Percentage of achievement of total wood workshop space with standard space. Obtained results of 129.3% meet the standards

The woodworking area in the woodworking workshop room at SMK N 1 Percut Sei Tuan has an area of 253 m<sup>2</sup> while the minimum standard work area is 256 m<sup>2</sup>. So the dimensions of the work area do not meet the standards. The percentage of achievement of standard areas with those in the field is 98.8%. This is also in accordance with the equipment layout standards contained in the Minister of National Education Regulation No. 40 of 2008 (Kurnia Apriliany, 2019). The area of storage and instructor space obtained a percentage of achieving the standard area with that in the field of 154.6%. This explains that the storage space and instructors meet the standards.

### 3.2 Completeness of tools and furniture

The main types of equipment are divided into three, (1) working toolbox set (in the form of hand tools), (2) working station Single, owned by each student and, (3) working station double, owned by each group of students. Apart from the main equipment used by the practice, there are also accessories.

#### Analysis of wood workshop space equipment

From the calculation results, 50% of the results did not meet the standards, while the analysis Working Station Doubles obtained by 200% met the standards. So when referring to the Minister of National Education regulation no. 34 of 2018 with a capacity of 18 students, all double working station equipment meets standards.

The results of the analysis of the amount of furniture in the woodworking workshop at SMK N 1 Percut Sei Tuan showed that there were several pieces of furniture that had not reached 100% or had not met the standards/learning needs of each type of equipment. There are two types of furniture that do not meet standards. However, if we look at the Minister of National Education Regulation No. 34 of 2018, the government only plans facilities and infrastructure with a capacity of 18 students, so the provision of furniture for the woodworking workshop at SMK N 1 Percut Sei Tuan has met the standards.

### 3.3 Lighting

There are two types of lighting used in the woodworking workshop of SMK N 1 Percut Sei Tuan, namely natural and artificial lighting. Natural lighting comes from sunlight emitted through existing windows and ventilation. For natural lighting, measurements were carried out 3 times, namely in the morning, afternoon and evening using a smart sensor brand lux meter with digital lux meter type AS803. This is due to the use of the wood workshop for practice until 14.30. Measurements were taken on November 21, 2023 and in sunny weather. The results of measuring natural lighting using a lux meter can be seen in the table below:

**Table 2.** Natural lighting using a lux meter in the woodworking workshop

Time	O'clock	Illumination Level (lux)			Rate-rate
		PI	PII	PIII	
Morning	08.45	366 lux	400 lux	343 lux	369,6 lux
Afternoon	12.15	439 lux	497 lux	468 lux	468 lux
Sore	14.30	463 lux	414 lux	430 lux	435,6 lux

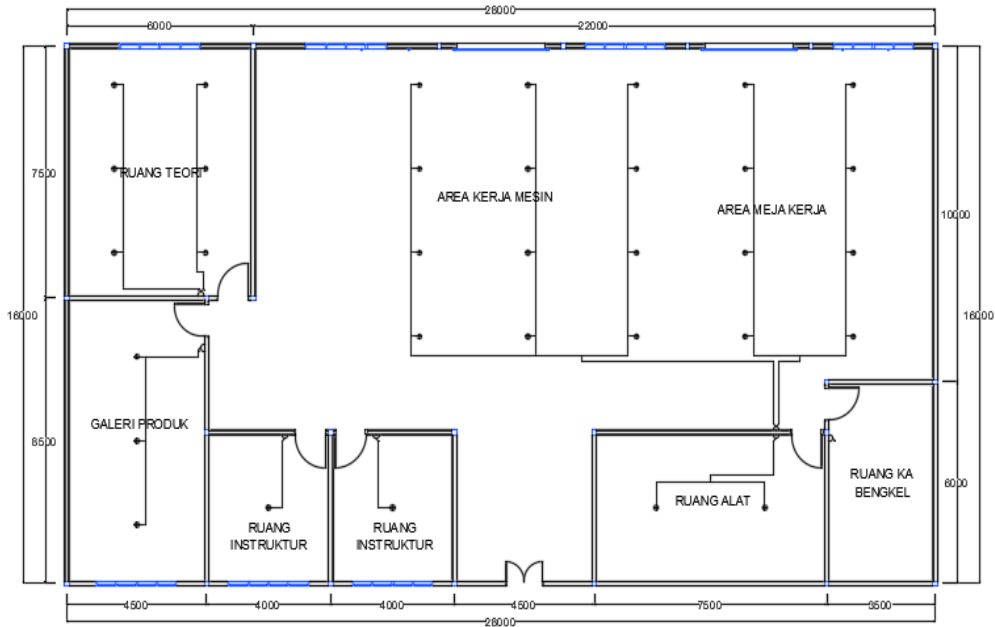
Information:

PI : First measurement

PII : Second measurement

PIII : Third measurement.

Meanwhile, the artificial lighting comes from 32 Wat Vario Hancochs LED Bulb lamps, totaling 20 points. Hancochs Vario lights have LED light specifications from Hancochs with voltage 150-240 V and 32 W electric power which is bright 3000 lumen.



**Fig. 1.** Workshop room plan

In the floor plan, it can be seen that not all doors function properly. Door 2 is closed because inside the room there is a device that prevents the door from opening. This can affect room lighting, where sunlight is blocked from entering the room.

The results of the analysis of the level of natural lighting in the woodworking workshop room at SMK N 1 Percut Sei Tuan do not meet standards. This is due to the location of the woodworking workshop. The woodworking workshop room at SMK N 1 Percut Sei Tuan faces south and north. That is why the natural lighting measurement results during the day are greater than in the morning and evening. For this reason, the school added artificial lighting so that the lighting level in the woodworking workshop meets the standard, namely 500 lux. During practical activities, the light in the woodworking workshop continues to be on. From the data analysis above, the artificial lighting calculations obtained a result of 141 lux. So to measure the total workshop lighting level, that is by adding up the average natural lighting level and level

## 4 Conclusion

Based on the research results and research discussions, the following conclusions can be drawn:

### 1. Wood workshop area at SMK N 1 Percut Sei Tuan

- a. The woodworking area meets the standard with an area of 253 m<sup>2</sup> almost reaches the standard figure of Permendiknas No. 34 of 2018 using a per-student ratio calculation of 256 m<sup>2</sup> with an achievement percentage of 98.8%.

b. The area of the equipment storage room and wood workshop instructor room meets the standards with an area of 74.25 m<sup>2</sup> greater than the minimum standard of Minister of National Education Regulation No. 34 of 2018 of 48 m<sup>2</sup> with an achievement percentage of 154.6%.

c. The total area of the wood workshop at SMK N 1 Percut Sei Tuan meets the standards with an area of 393.25 m<sup>2</sup> greater than the minimum standard of Minister of National Education Regulation No. 34 of 2018 of 304 m<sup>2</sup> with an achievement percentage of 129.3%.

## 2. Equipment and furniture for the woodworking workshop at SMK N 1 Percut Sei Tuan

a. wood workshop equipment and furniture meets the standard with the number of hand tools there are 3 types of tools that meet the standard and 12 types of tools that do not meet the standard, tools working station double there are three types of tools that meet the standards and five types of tools that do not meet the standards; There are only three types of equipment that meet the standards.

b. There are nine types of furniture in the wood workshop at SMK N 1 Percut Sei Tuan that meet the standards and one piece of furniture does not meet the minimum standards of Minister of National Education Regulation No. 34 of 2018.

3. The total lighting level of the wood workshop room at SMK N 1 Percut Sei Tuan in terms of the SNI 03-6575-2001 standard for wood work meets the standard, namely 500 lux with a lighting level in the morning of 510.6 lux, in the afternoon 609 lux and in the evening 576.6 lux.



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