

# Determining location of vocational schools based on area potentials of Pasuruan Regency

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## **Determining location of vocational schools based on area potentials of Pasuruan Regency**

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### ABSTRACT

The development in several regions demands the availability of infrastructure facilities to support the lives of its people. Among them are educational infrastructure in the form of schools, especially Vocational Schools that are suitable with local needs and potentials. The real conditions show that there is a grouping of vocational schools in certain sub-districts. These problems are only part of the existing problems related to the existing conditions of vocational highschools. There are still other potential problems that will be discussed and answered in this study, which are related to physical conditions and economic factors.

**Key words :** Location, Vocational high schools and Factor analysis.

### Introduction

Pasuruan Regency as one of the hinterland areas of Surabaya, which is included in the Surabaya Extended Industrial Area or Surabaya EIA (Kuncoro, 2002), is one of the areas that has rapid development. The development of Pasuruan Regency demands the availability of social infrastructure, one of which is educational infrastructure. Regarding this matter, the Ministry of National Education Strategic Plan 2005/2009 states that one of the Basic Policies for the Development of National Education is even distribution and expansion of access, one of which is to expand access to vocational education according to local needs and potentials.

Basically, the selection of vocational school's location will be more effective and suitable when it is

united and spatially concentrated with activities of the surrounding communities, so it can bring about savings due to *economies of proximity* principle. Not only limited to economic matter, but the maximization of functions and services of the vocational schools becomes another consideration too. Regardless of the existing benefits, this results in a grouping of certain sub-districts.

This problem is only a part of the existing problems related to the existing conditions of vocational education in Pasuruan Regency. There are still other potential problems that can arise such as those related to physical conditions, including the location suitability of the educational units based on standards of comfort, security and environmental health, availability of supporting infrastructures such as electricity, water and telephone networks,

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as well as economic factors related to the suitability of economic potential with majors found in each sub-district of Pasuruan Regency.

The existing problems above need a solution such as a concept of appropriate determination of vocational school's location. Questions such as what factors that needs to be consider for **determining the location of vocational schools in Pasuruan Regency** as well as how are the appropriate location directions for overcoming the inequality of vocational school's location will be tried to be answered in this paper.

### Literature Review

#### 1. School Location According to Engelhardt

Engelhardt explained that considerations are needed for selecting a school location from several plots of land. The most important thing is that school administrators can measure each location by using a *scorecard* containing several criteria (Engelhardt in De Chiara *et al.*, 1978). The *scorecard* in question contains several considerations for selecting a school's location, which generally outline several aspects as follows:

1. Current and future environmental conditions.
  - a. Environmental conditions in the neighborhood.
    - 1) Characteristics of the surrounding neighborhood.
    - 2) Free from disruption of economic activities.
    - 3) Free from noise, odor, dust and industrial traffic.
    - 4) Away from the railway lines, airfields and docks.
    - 5) Away from busy road traffic (toll road).
  - b. Protected from lines of existing and planned flight.
  - c. There are future prospects of the surrounding environment.

2. Linkages with community development plans.
  - a. Acceptable in community development plans.
  - b. Do not interfere with other community development plans.
  - c. Broad community's value in use.
3. Role in a comprehensive school development plan.
  - a. Scientific determination of the location by considering current and future populations.
  - b. Integration with the existing schools.
  - c. Location with the main school programs.
  - d. Official agreement of public locations.
4. Coverage of site.
  - a. Comfort in educational programs for current and future periods.
  - b. Realization of the above suggestions, minimum at each level:
  - c. Protection for educational expansion in the future.
  - d. Provision of playing areas at each level for current and future periods.
5. Accessibility
  - a. Accessibility for the general public.
  - b. Optimal distance for children / students.
  - c. Feasibility / possibility in reaching the locations.
  - d. Safety in reaching the locations.
6. Site Characteristics.
7. Utility services.
  - a. Proximity with utility networks.
  - b. Feasibility / possibility in the provision of utility networks.
8. Costs / Prices.
  - a. Land prices.
  - b. Land processing costs.
  - c. Network utility costs.

#### 2. Christaller's Central Place Theory

Tarigan (2005) tried to explain Christaller's theory

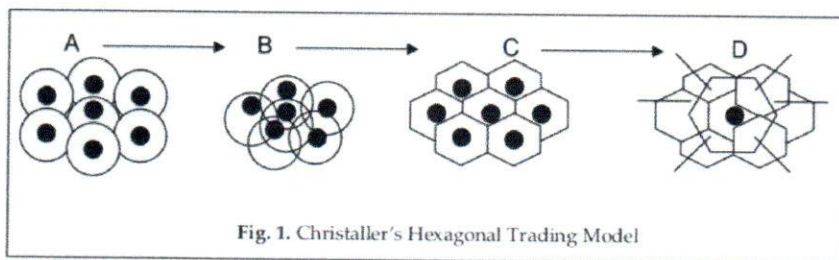


Fig. 1. Christaller's Hexagonal Trading Model

Source: Processed from Tarigan, 2018



about the composition of the city, the number of cities, and its distribution in one area. The Christaller's model is a geometry system where number 3 is determined arbitrarily to have a very significant role, so it is also called the  $K = 3$  system from Christaller.

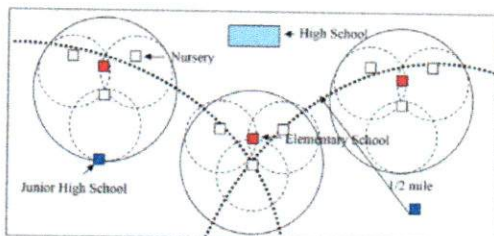
Based on the  $K = 3$  system, Christaller presented the hexagonal trading area model, as illustrated in the following figure:

It can be concluded that initially an area of economic activity was formed in the form of circle. The circle represents the threshold population and service range of the economic activity. Threshold population is defined as minimum population that can support an offer for services. Population number affects the services provided by the existing economic activities. The low number of population will result in expensive and inefficient services. On the contrary, the excess population will result in a decrease in the quality and effectiveness of services. Whereas what is meant by market coverage of an economic activity is the distance that consumers are willing to take for obtaining services from these economic activities (Djojodipuro, 1992).

#### Distribution of Social Infrastructure (De Chiara)

De Chiara *et al.* (1975) described the distribution of social infrastructure through figure as follows.

It can be explained by the figure above that in a neighborhood which is limited by the neighborhood boundary (large circle) at least there are 3 (three) residential areas symbolized by a smaller circle. The residential area is served by at least one nursery school (TK). The three residential areas are served by 1 (one) elementary school (SD) located within the neighborhood boundary, so that one neighborhood is served by at least one elementary school. While junior high school (SMP) is located outside the neighborhood boundary, which serves several neighborhoods that are located nearby, with the maximum distance



Source: Processed from De Chiara *et al.*, 1975.

Fig. 2. Typical District Organization

from junior high school of 1 / 2 miles away. Likewise with high school (SLTA), one high school at least serves several neighborhoods or even one sub-district with maximum distance between 3/4 to 1 miles away by walking, or a bus must be available if the distance is farther.

#### Methods of Study

##### Data Collection

There are two types of data used in this study. The first is primary data that obtained by using interview techniques, questionnaires and field surveys. The second one is secondary data which obtained from the existing documentation.

Questionnaire is a number of written questions that are used to collect information from respondents regarding their personal reports, or things they knows. Questionnaire in this study serves as input in the analysis of factor determination that is Delphi method.

The field survey conducted in this study aims to collect data through direct observation towards the existing location alternatives. By using an assessment table of land condition containing variables and land suitability criteria, a field survey was conducted with purpose of knowing the suitability of each existing location alternative that could not be fulfilled by secondary data.

##### Analysis Method

The collected data such as primary data obtained through interview techniques, questionnaires and surveys, and secondary data which obtained through literature review / documentation are then analyzed. The data obtained then analyzed through 3 (three) stages, i.e. Analysis of Factor Determination, Analysis of Vocational Needs Determination, and Analysis of Vocational Location Determination in Pasuruan Regency.

##### Analysis of Factor Determination

Delphi is the main analysis tool used at this stage that works through a systematic procedure to get a consensus of opinions from a group of experts. The basic principle of the Delphi analysis is *Anonymity* and *Iteration*. *Anonymity* is a condition where all experts or knowledgeable people (respondents) respond separately and do not know between each other. While *Iteration* is a kind of assessment of each

expert (respondent) that is collected and re-communicated to all experts (respondents) who commented in two rounds or more.

The use of Delphi in this study serves to explore and interact with the initial variables / sub-variables generated from the literature review to a number of respondents. Thus, the final result in the form of several variables / sub variables which are factors that influence the determination of location of vocational schools in Pasuruan Regency is generated.

#### Analysis of Vocational Needs Determination

The final result of this study is an ideal and compromise concept for determining Vocational School's location in Pasuruan Regency. The determination of Vocational School's location is elaborated through the determination of location symbolized in a polygon area on a map. Thus, before determining the location of the Vocational School, a number of vocational needs in each sub-district of Pasuruan Regency must be first determined.

Based on the formula on the Indonesian National Standard (SNI) No. 03-1733-2004 of 2004 concerning Procedures for Planning a Residential Location in Urban Areas, a number of vocational needs in each sub-district can be determined. Calculation of formulas based on SNI No. 03-1733-2004 is suggested as follows;

$$Ss\text{lta} = \frac{(L\text{sltp}5 - L\text{sltps})}{E} \times a \%$$

dimana,

- Ss\text{lta} = Study room needs at high school level (SLTA).  
 L\text{sltp}5 = Projection of junior high school's graduates for 5 years.  
 L\text{sltps} = Number of junior high school's graduates that can be accommodated (capacity of the existing high school).  
 a % = Percentage of junior high school's graduates who continue to high school.  
 E = The most effective and efficient study room capacity based on environmental conditions (40 students).

#### Analysis of Vocational Location Determination

With purpose to find the best location of Vocational School in Pasuruan Regency, the next stage of analysis is conducted, namely Analysis of Vocational Location Determination. In this analysis

stage, *Super Impose* analysis is used as one of the analysis tools in GIS (Geographic Information System) which is combined with Qualitative Data Quantification analysis in the form of *Scoring / Weighting*.

*Super Impose* analysis works by overlaying or stacking the related thematic maps to generate several alternative locations of Vocational Schools. Along with the *Super Impose* analysis, *Scoring / Weighting* analysis is carried out, with purpose to equate the value unit from several aspects (variables) that affect the existing location. Locations with the highest total score / weight of several aspects (variables) are considered as the best Vocational School's locations.

### Study Results and Discussion

#### 1. Analysis Results of Factor Determination

Several variables/sub-variables generated in the literature review were then interpreted through Delphi analysis to a number of experts who were representatives of several existing stakeholder groups. The Delphi analysis conducted consists of 3 (three) stages, where conclusions are resulted in the form of several variables/sub-variables which are factors that influence the determination of Vocational School's location in Pasuruan Regency as follows:

1. Environmental conditions (current and future).
  - a. Neighborhood conditions.
  - b. Protected from the existing and planned flight lines.
  - c. There are future prospects of the surrounding environment.
  - d. Urban formation / settlement patterns (Neighborhood boundary).
2. Integration with the development plan.
  - a. Acceptable in the community development plans.
  - b. Do not interfere with other community development plans.
3. Integration with the development of comprehensive education.
  - a. Scientific location determination by considering current and future populations.
  - b. Integration with existing schools.
4. Accessibility.
  - a. Accessibility for public in general.



- b. The optimal mileage for children / students.
- c. Feasibility / possibility in reaching the locations.
- d. Safety in reaching the locations.
5. Site Characteristics.
  - a. The available Utilities.
  - b. Proximity to the utility networks.
  - c. Feasibility / possibility in providing utility networks.
  - d. Land area.
6. Costs / Prices.
  - a. Land prices.
  - b. Land processing costs.
7. Range and hierarchy / service level.
8. Compatibility of majors with local potential and excellence.

#### 2 Analysis Results of Vocational Location Determination

Based on several variables / sub-variables which are determinant factors of Vocational School's location in Pasuruan Regency, especially variables / sub-variables in the form of spatial data, then *super impose* analysis was conducted combined with *scoring / weighting* analysis. *Scoring / weighting* is conducted by describing the existing spatial data into a form of criteria, each criterion has different values and weights. The determination of value and weight of each criterion is conducted by each of the respondents.

The determination of values and weights for each criterion by each respondent is suggested in table 2 below regarding Land Suitability Weighting Criteria.

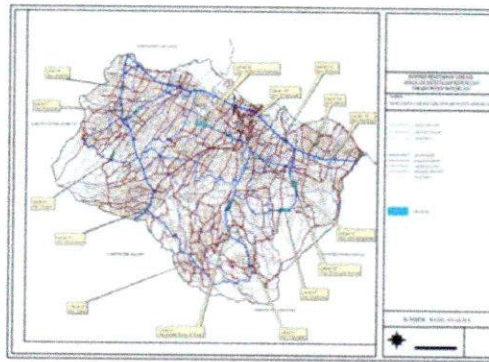


Fig. 3. Vocational School's location in Pasuruan Regency

Here is a summary of results of the *scoring / weighting* analysis combined with *super impose* analysis. Through the overlaying process on the *super impose* analysis, a final result will be generated from the analysis of determination of the Vocational School's location in Pasuruan Regency. It takes form a polygon area as the most suitable area for the Vocational School's location in several sub-districts mentioned above.

Table 1. Land Suitability Weighting Criteria in Determining Vocational School's Location in Pasuruan Regency.

No	Variables / Sub-Variables	Aspects/ Indicators	Weight	Score
1	Environmental conditions (current and future). (VARIABLE 1)	1 Distance from industrial areas, railway lines, docks, airfields, toll roads, and other potential disturbances.	5	
2	Integration with Development Plan. (VARIABLE 2)	2 Integration with the development plans, especially those related to land use (feasibility of land use conversion).	3	
3	Accessibility. (VARIABLE 3)	3 Accessibility - radius 400 m with primary artery.	5	5
		4 Student mileage / service radius.	4	
		5 Possibilities for reaching the locations.	5	
4	Site Characteristics. (VARIABLE 4)	6 Land slope condition.	2	
		7 The availability of telephone network.	2	
		8 The availability of electricity network.	2	
		9 The availability of clean water network.	2	
		10 Land area.	3	

Source : Analysis Results, 2018.

### Conclusion

Based on the results of analysis stages that have been carried out, it can be concluded that:

1. There are 8 (eight) variables and their sub-variables which become determinant factors of the Vocational School's location in Pasuruan Regency.
  - a. Variable 1. Environmental conditions (current and future).
  - b. Variable 2. Integration with development plans.
  - c. Variable 3. Accessibility.
  - d. Variable 4. Site Characteristics.
  
2. Second, from the analysis results of vocational needs determination in Pasuruan Regency, it can be concluded that the number of vocational schools needed in Pasuruan Regency is 15 (fifteen) schools. Furthermore, based on the Analysis of Location Determination of Vocational Schools in Pasuruan Regency, it can be determined that the most suitable direction for vocational school's location are included several locations as follows: Purwodadi Sub-district specifically in Parerejo Village, Tutar Sub-district specifically in Wonosari Village, Pasrepan Sub-district specifically in

Mangguan Village, Prigen Sub-district specifically in Dayurejo Village, Pandaan Sub-district specifically in the border area of Kemirisewu, Kebonwaris, Nogosari and Kutorejo villages, Gempol Sub-district specifically in Ngerong Village.

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