Article-20

Eco. Env. & Cons. 25 (4) : 2019; pp. (145-150) Copyright@ EM International ISSN 0971–765X

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

Agus Wiyono¹, Suryanto² and Dedy Rahman Prehanto³

 ¹ Civil Engineering Department, Engineering Faculty of Surabaya State University, Surabaya, Indonesia
² Mechanical Engineering Department, Engineering Faculty of Surabaya State University, Surabaya, Indonesia
³ Informatics Engineering Department, Engineering Faculty of Surabaya State University, Surabaya, Indonesia

(Received 17 April, 2019; accepted 14 June, 2019)

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 areasthat 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,

*Corresponding author's email : aguswiyonodoctor@gmail.com

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 aconcept of appropriate determination of vocational school's location. Questions such as what factors that needs to be considerfor 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 severalcriteria (Engelhardt in De Chiara *et al.*, 1978). The *scorecard* in question contains several considerations forselecting a school's location, which generally outline several aspectsas follows:

1. Current and future environmental conditions.

- Environmental conditions in the neighborhood.
 - Characteristics of the surrounding neighborhood.
 - 2) Free from disruption of economic activities.
 - 3) Free from noise, odor, dust and industrial traffic.
 - Away from the railway lines, airfields and docks.
 - 5) Away from busy road traffic (toll road).

 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.
 - 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.
 - Comfort in educational programs for current and future periods.
 - Realization of the above suggestions, minimum at each level:
 - c. Protection for educational expansion in the future.
 - 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.
- 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



Source: Processed from Tarigan, 2018

WIYONO ET AL

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 theneighborhood 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 Distric Organization

from *junior high schoolof* 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 respondentsregarding theirpersonal reports, or things they knows (Arikunto, 1996). 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 knowledge able 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;

$$Sslta = \frac{(Lsltp5 - Lsltps)}{E} \times a \%$$

dimana,

Sslta = Study room needs at high school level (SLTA).

- Lsltp5 = Projection of junior high school's graduates for 5 years.
- Lsltps = 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.

- Acceptable in the community development plans.
- b. Do not interfere with other community development plans.
- Integration with the development of comprehensive education.
 - a. Scientific location determination by considering current and future populations.
 - b. Integration with existing schools.
- Accessibility.
 - a. Accessibility for public in general.

WIYONO ET AL

- 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.

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'slocation 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 l	Pasuruan F	Regency
----------	------------------	-----------------------	-------------	--------------------	-----------------	------------	---------

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

- There are 8 (eight) variables and their sub-variables which become determinantfactors 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. Variable3. Accessibility.
 - d. Variable4. Site Characteristics.

2. Second, from the analysis results of vocational needs determinationin Pasuruan Regency, it can be concluded that the number of vocational schoolsneeded 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, Tutur 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.

References

- Chiara, Joseph De and Keppelman, Lee 1975. Urban Planning and Design Criteria, Van Nostrand Reinhold Company, New York.
- Chiara, Joseph De and Keppelman, Lee 1978. Site Planning Standards, McGraw-Hill, Inc., New York.
- Department of National Education, 2005. Rencana Strategis Departemen Pendidikan Nasional Tahun 2005-2009, Department of National Education, Jakarta.
- Djojodipuro, Marsudi, 1992. Teori Lokasi, LPFE-UI, Jakarta.
- Kuncoro, Mudrajat, 2002. Analisis Spasial dan Regional Studi Aglomerasi dan Kluster Industri Indonesia, AMP YKPN Yogyakarta, Yogyakarta.
- Setyowati, Endah and Wiyono, Agus. 2018. Weighting Factors Affecting Vocational Education Development To Support Regional Potential. International Journal of Education and Research. 6 (3): 179-186.
- Tarigan, Robinson 2018. Ekonomi Regional Teori dan Aplikasi, Revision Edition, Bumi Aksara, Jakarta.
- Wiyono, 2018. Spatial Modeling Vocational Education Development To Support Regional Potential. Ecology, Environment and Conservation. 24(4): 2018.

150

ECOLOGY, ENVIRONMENT AND CONSERVATION VOL. 25 (4) : 2019

CONTENTS

1-8	First inventory and phenology of waterbirds attending the urban pond of Tamlouka (North- East Algeria) —Hamli Alouia, Maazi Mohamed-Cherif and Houhamdi Moussa
9–14	Optimization model predictive EPSAC control of dissolved oxygen of the activated Sludge wastewater treatment plant —Nissrine Drioui, El houssine El Mazoudi and Jamila El Alami
15–19	Studies on flowering and fruiting rhythms of 'Cristal' Guava (<i>Psidium guajava</i> L.) at three different Locations, Indonesia — <i>R.A.D. Widyastuti, S. Susanto, M. Melati and A. Kurniawati</i>
20-26	Factors affecting adoption of local potential intensification system "Siplo" —Dwi Susilowati and Sugiarto
27-34	Diversity and distribution patterns of land snails in the arid region of Batna (North East Algeria) —Narimène Ameur, Rachid Adjroudi, Abdelkrim Si Bachir and Nadjoua Mebarkia
35-42	An integrative study to determine the Bioavailability of heavy metals in the soil —Raghad Shubbar Jaafar, Ahmed yousif, Zuhair A. Abdulnabi, Abdul Zahra Alhello and Hamid T. Al-Saad
43-46	Possibilities of fungal biodegradation of antimalarial and anticancer primaquine in the environment —Igor A. Parshikov and Evgeny I. Zaraisky
47-59	Morphological analysis of municipal solid waste: Review —Olha Yavorovska and Igor Dudar
60-64	Representation of <i>Repong damar</i> on Krui indigenous people in supporting forest conservation in Lampung, Indonesia —Novia Fitri Istiawati, Budijanto, I. Nyoman Ruja and Singgih Susilo
65-70	Bacterial disease agents of Cyprinus carpio from some farms in Basra, Iraq —Al-Shammari, N.A.H, Al-Taee A.M.R [.] and N.R. Khamees
71-78	The ability test of Microalgae consortia Chlorella vulgaris and Spirulinaplatensis removing cadmium (II) —Bieby Voijant Tangahu ¹ , Patricia Agnes Hutabarat ¹ and Triadna Febriani Aabidah ¹
79-88	Study and evaluation of the quality of local and imported bottled drinking water available in the market of Kirkuk city, Iraq —Ali Abdul Khaliq Kamal, Abdul Khaliq Kamal Mahmood and Abbas Mohammed Noori
89–96	Biochemical screening of amylose content in grain of proso Millet (Panicum miliaceum L.) collection —Aiman Bokenovna Rysbekova, Dyussibayeva Elmira Navrusbekovna, Zhirnova Irina Alexandrovna, Seitkhozhaev Abilbashar Ilyasovich, Zhakenova Aiym Erbolkyzy and Vladimir Igorevich Tsygankov
97-104	The potentials of home garden plants and animals in minggir and godean sub-districts, Indonesia as the learning resources of biodiversity —Suhartini
105-113	Dynamics of physical development of children as an indicator of recovery condition of biogeochemical province —Arai M. Tolemisova and Zhanna A. Kulanchiyeva

П	CONTENTS	Eco. Env. & Cons. 25 (4) : 2019				
114–118	Mangosteen (Garcinia mangostana L.) peel extract increase Langerhans Islet Diameter and Plasma Insulin level in Diabetic Mice —Saikhu Akhmad Husen, Muhamad Frendy Setyawan, Raden Joko Kuncoroningrat Susilo, Arif Nur Muhammad Ansori, Suhailah Hayaza and Dwi Winarni					
119-130	Spatial distribution and functional characteristics of soil arthropods in Super wet tropical rainforest, Indonesia —Fenky Marsandi, Hermansah, Agustian and Syafrimen Yasin					
131–138	Land resource management of Sambori indig Ethnoecological aspects —Junaidin, Sugeng Utaya, I. Komang Astina and Sing	enous community area viewed from gih Susilo				
139–144	Geometric morphometric sexual dimorphism in A and An. subpictuss L. —Tanawat Chaiphongpachara	nopheles barbirostriss L., An. epiroticus,				
145-150	Determining location of vocational schools based o —Agus Wiyono, Suryanto and Dedy Rahman Prehant	n area potentials of Pasuruan Regency				
151-156	A study on the local wisdom of the bali AGA comm forest as an effort to build character of caring for the —Sumarmi, Syamsul Bachri, Ardijanto Tanjung and T	unity <i>Metruna nyoman</i> in the indigenous e environment Yuti Mutia				
157–166	Cypermethrin induced the temporal expression Osmoregulation related genes in the Asian Seabass —Rachanimuk Hiransuchalert, Napaporn Leadpra Srimongkol and Sripapan Taranart	a changes of the stress response and 6 (Lates calcarifer) 1thom, Thiamjun Suwunnarod, Grittaya				
167-174	Effective evolution and reproduction of the ferrugi (Northeast of Algeria) —Souad Narsis, Abdessalam Grira, Mohammed-Laid	inous duck (Aythyanyroca) in tonga lake Ouakid and Moussa Houhamdi				
175–180	Identification of phytopathogenic bacteria of genu method —Indira Saltanovna Beishova ^{1*} , Alexandr Mikhaila Poddud in skaya ¹ , Vadim Aleksandrovich Ulyanov ¹ d	as Pseudomonas using the real-time PCR ovich Kovalchuk ¹ , Tatyana Vladimirovna and Kuantar Daulenovich Alikhanov				
181–187	An upda ted ch ecklist of mosquito vector species (I Province, Thailand —Tanawat Chaiphongpachara	Diptera: Culicidae) of Samut Songkhram				
188-193	The rate of recolonization by native plant species a plant species (Populus alba L.) in the Limpopo Prov —Melford Mbedzi, Peter Tshisikhawe, Innocent Sinth	ofter the Eradication of the invasive alien ince, South Africa numule and Sebataolo Rahlao				
1 94–2 00	Chlorophyll-a cocentration utilizng landsat 8 near a —Abd Rahman Mat Amin, Fathinul Najib Ahmad S Wan Kamarudin, Asmala Ahmad and Edmand Bedu	and middle infrared spectrum Ga'ad, Adida Muhammud, Wan Farahiyah urus				
201-207	The role of community institutions on land use a South Sulawesi Indonesia —Annas Boceng, Sukoso, Soemarno and Amir Tjonen,	utilization in Salu Paku Sub-watershed g				
208-210	Effect of artificial light on the migratory activity of branickii During daily vertical migration in Lake Ba —Dmitry Karnaukhov, Ekaterina Dolinskaya, So Khomich and Eugene Silow	of the pelagic amphipod Macrohectopus nikal fia Biritskaya, Maria Teplykh, Andrey				
211–217	Effect of different planting densities and fertilizer r under Northern Vietnam growing conditions —Le Quy Tuong, Nguyen Tuan Khoi, Duong Van Qu Nguyen Cong Thanh	rates on corn yield and yield components uan, Bui Bao Thinh, Bui Danh Chung and				

100

·, ··· ,