Needs Analysis of Regional Potential-Based Vocational High School Development

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This study aims to reveal vocational high schools' (VHSs') areas of expertise and expertise programs that are feasible to be developed based on regional potential. As an exploratory descriptive research conducted in Berau Regency, it employs documentation and interviews to collect data. Quantitative data analysis is carried out through principal component analysis, location-quotient method, Sprague multiplier method and exponential method. Qualitative data analysis was carried out by using data reduction, data presentation, and verification. The results reveal that the sub-districts that need VHSs in Berau Regency include Kelay, Tabalar and Maratua. The areas of expertise needed at Kelay include agribusiness and agrotechnology with the agribusiness program of estate crops and estate crop processing. Tabalar necessitate agribusiness and agrotechnology with agribusiness plant expertise program and agricultural product processing. Maratua require the fields of tourism with hospitality and tourism services, as well as food engineering.

Key words: *Vocational high school, needs analysis, regional potential.*

Introduction

Quality human resources are a vital power and great asset for regional or state development. Those who reside within the country's territory will indirectly influence the economy and development of the region as well as the country (Batey, 2002; Gennaioli, et. al., 2011; Kazmi, et. al., 2017; Nayadenov, 2019). Human capital related to labour is important for regional and national progress . Strong and quality human resources are expected to be able to classify, process and develop all regional potential into something useful, valuable and beneficial to the regional population.

Skilled and productive labour is needed in the current era of global trade and competition (Mellander & Florida, 2014), and one of the ways to produce a competent, productive and

professional workforce is through vocational education (Maclean & Wilson, 2009). Vocational education (VE) can be interpreted as a series of learning activities designed to equip individuals with the theoretical knowledge and professional skills needed by certain types of work (Mortaki, 2012), education for work (Pavlova, 2009), or education for working life (Billet, 2011).

VE allows individuals to be able to create jobs with their skills and abilities . It assists the economic growth of a region through the development of workforce skills. Studies conducted in European countries (Cedefop, 2011), as well as OECD (Hoeckel, 2008) and ASEAN (Bay & Paryono, 2019) indicate that vocational education has economic and social benefits at the micro (for individuals); *meso* or medium (for enterprises/groups); and macro-level (for society as a whole). Vocational education and training (VET) have positive outcomes such as higher wages, improved productivity and economic growth. In addition, it also provides non-economic benefits such as lower absenteeism and less crime (Cedefop, 2013). VE has also proven to assist in finding in the labour market and creating employment and entrepreneurship (Bhurtel, 2015).

One of the VE institutions in Indonesia is vocational high schools (VHSs). VHSs not only prepare individuals to be able to work using various competencies, they also focus on securing the type and level of skills needed during the individual's work (Billet, 2011). They can be interpreted as a strategic program aiming to provide skilled workers in the middle level who possess great potential in developing various industrial sectors in the region (Yoto, 2016). Such educational institutions are also called technical secondary schools. This is due to the fact that "under school-based Technical, Vocational Education and Training (TVET), a student's timetable is dominated by practical skills learning and directly related theory" (Lauglo, 2005).

Given those remarkably central VHS objectives, VHS development planning needs to be carried out thoroughly and intensely. Furthermore, it should be based on and implemented with various considerations, by seeing the advantages and potential of each region in economic and socio-cultural sectors, as well as other factors. VHSs developed based on the regional potential seem to have a very important role. Regional potential-based VHSs can produce human resources that can develop their local potential so that it subsequently impacts economic growth (Liah, et. al., 2019). VHSs established without careful planning and serious attention to both aspects, therefore, may not make positive contributions and will only generate and increase joblessness in the area.

VHS development carried out without careful arrangement and in-depth study tends to have a negative impact, including 1) a mismatch between graduate competencies and industry needs; 2) high number of graduates in specific areas of expertise due to inadequate VHS development, and 3) poor and purposeless VHS development systems and facilities (Yulius, 2017). Some

principles to consider in developing vocational schools comprise of 1) relevance to regional potential and the real needs of industry; 2) flexibility, VHSs must be adaptive to various changes pertaining to society and the development of Science and Technology; 3) continuity, where correspondence between current VHS graduate skills and future needs is considered; 4) efficiency; 5) effectiveness (Ninarman, 2016).

Regional superior potential-based VHSs have been held with highly central objectives, including reducing poverty, increasing original local government revenue and strengthening and conserving culture and values (Sudira, 2016). Education at VHSs, thus, teach students to be able to work independently and become entrepreneurs. These graduates are expected to be able to grasp all opportunities and potential existing in their area, so they no longer depend on available regional job vacancies (Sadewo, et.al., 2017).

The development of regional potential-based VHS should be pursued with an in-depth and systematic study so that optimal planning can be guaranteed. Various studies have been carried out to develop VHSs in accordance with regional potential (Wiyono, 2017; Wardhana & Sukamto, 2018; Wahyuni, et. al., 2018), however, they have not been comprehensive or complete in terms of quantity to student projections and classroom needs within a certain period. This research aims to provide a comprehensive formulation of a VHS development plan based on regional potential, based on four main focuses: 1) analysis of potential and resources; 2) preparation of several concepts regarding the development of region-based education 3) preparation of short, medium, long term programs 4) human resource planning and supporting facilities (Wagiran, 2010).

The study was conducted in Berau Regency in East Kalimantan Province, a region with the highest gross regional domestic product (*PDRB*) in Indonesia yet having gaps regarding socio-employment . Besides the relatively slow development of the region, Berau also has a lot of unemployed VHS ex-students. These problems indicate the influence of the following factors: 1) The programs and areas of vocational expertise in Berau were less relevant to regional potential . 2) Existing VHS programs and areas of expertise in Berau were less relevant to the real needs of local industries. 3) VHS graduates did not have the qualifications and specifications needed to be able to work in local industries. 4) Businesses initiated and run by VHS alumni could not develop properly because they were potentially not supported by the potential local area . 5) VHS graduates lack a strong entrepreneurial spirit. Another problem is the centring of VHSs at one point in the region. While there are 13 Districts and 14 Vocational Schools in Berau Regency, a total of 8 VHSs or 53.85% of the existing VHS are in the capital city of the regency, Tanjung Redeb. Six sub-districts each have 1 VHS in their area, whereas the other 6 sub-districts do not have a vocational school at all (The Statistics Berau Regency, 2018).

Methodology

This is a descriptive exploratory study in which data sources include the CHS Development Division of the East Kalimantan Provincial Education Office, Berau Education Office, Berau Manpower and Transmigration Office, Berau Development Planning Board (*Bappeda*), and the Berau Statistics. Data is both qualitative and quantitative . Qualitative data is collected through interviews assisted by interview guidelines, while the interview questions are validated by expert judgment. The validity of documents was analysed through triangulation of its collection techniques and sources, member checking, and developing concise descriptions, as well as self-reflection. The analysis of qualitative data or interview results was conducted by triangulation techniques, data presentation and verification.

Based on comprehensive study of the method, the research stages of needs analysis of the areas of expertise or expertise programs in VHSs is formulated in Figure 1 based on regional potential.

Figure 1. Research Procedures
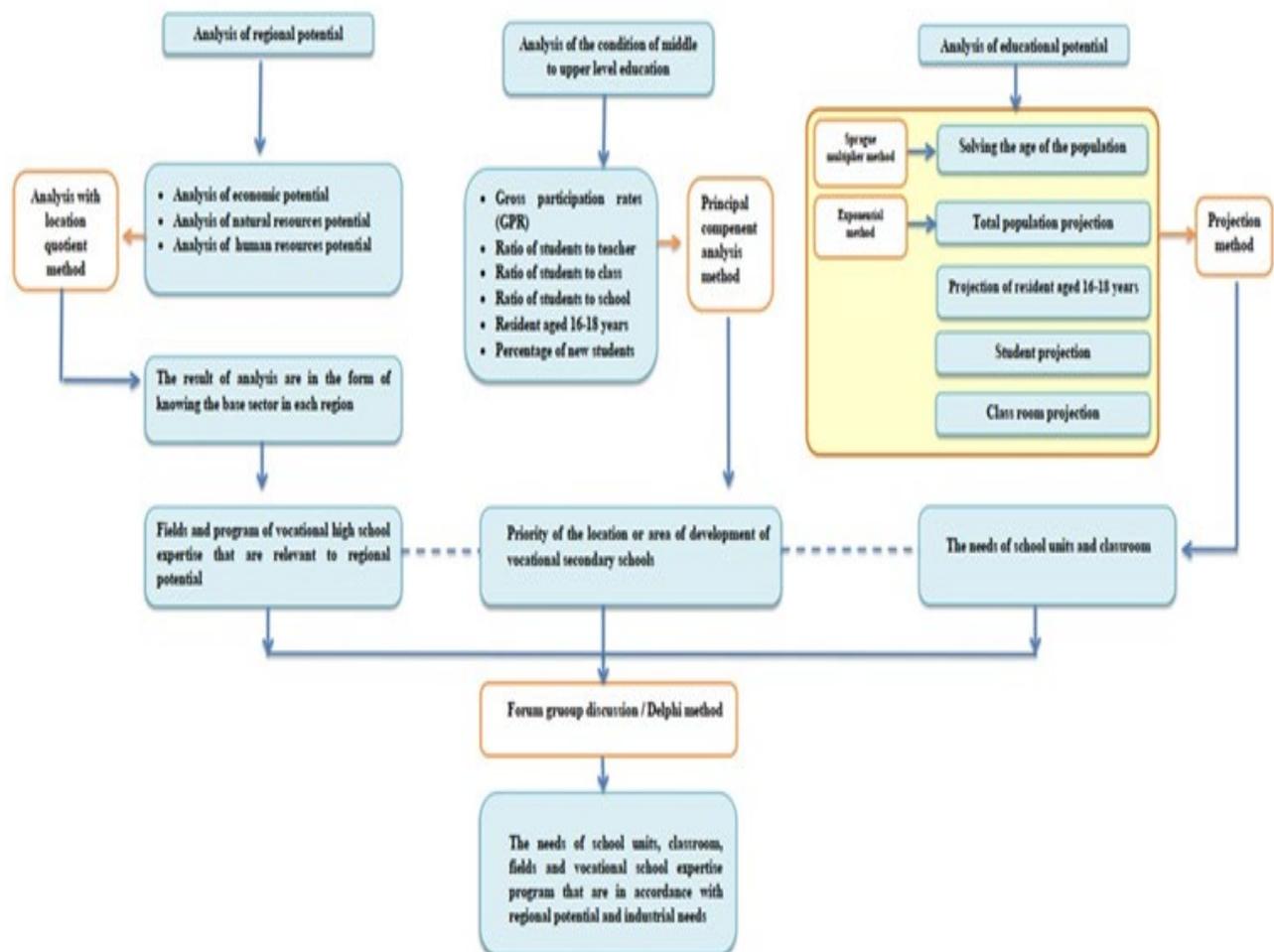
The detailed stages of the research can be described as follows.

1. Analysing the area of development priority. The analyses carried out include:
a. Classifying population ages by the Sprague multiplier method in order to determine the high school-age population (16-18 years of age) in each sub-district. The Sprague multiplier method was carried out with the support of Microsoft Excel .
b. Population projection was carried out using the exponential method. This method was selected because it has the most accurate and reality-based results. The projection was completed using Microsoft Excel.
c. Determining the priority of VHS development locations was completed by means of the principal component analysis (PCA) method. The smaller the PCA score, the higher the regional position to become a priority in VHS development in Berau Regency.

2. Analysing regional potential , including leading and potential natural resources, economy and human resources. The second stage of the analysis was carried out by two steps, firstly analysing potential and superior natural resources and secondly evaluating the economy and labour capital in each region to determine the regional-based sector. Analysis of the regional economic base sector was completed   using the location quotient (LQ) method. Determining basis and non-regional basis were completed by examining the LQ score of the relevant business sector (Kalzum, 2018) with the provisions provided in Table 1.

Table 1: Base and non-base sector categories based on LQ calculations

LQ score	Category
>1	Base sector
=1	Non-base sector
<1	Non-base & non-competitive

3. Analysing the needs of VHS classrooms and buildings in each region. After obtaining the results, a projection of regional needs for VHS classrooms and buildings can be arranged for the next five years.

Findings and Discussion

The findings are elaborated in this section.

1. Priority areas for VHS development are determined based on the scores obtained from the results of the principal component analysis (PCA) as presented in Table 2.

Table 2: PCA Analysis Results

Sub-District	PCA Score	Priority Number	Sub-District	PCA Score	Priority Number
Tanjung Redeb	1138.92	13	Tabalar	141.73	2
Teluk Bayur	680.58	12	Biatan	261.06	6
Sambaliung	595.88	11	Batu Putih	185.75	4
Gunung Tabur	519.90	10	Biduk-Biduk	289.19	7
Kelay	127.36	1	Pulau Derawan	293.13	8
Segah	311.70	9	Maratua	150.81	3
Talisayan	234.37	5			

Based on the calculation and analysis, there are three districts that need to be a priority in the development of VHSs in Berau Regency including Kelay, Tabalar and Martua Sub-Districts. On the other hand, Biatan, Biduk-Biduk, and Segah Sub-Districts are the areas with the lowest priority.

2. Vocational programs and expertise areas that need to be developed in each region are based on regional potential. The results of the analysis of regional potential based on both potential in natural resources and region-based business sectors are shown in Tables 3 and 4.

Table 3: Leading Natural Resources of each Sub-District in Berau Regency

Sub-Districts	Leading Natural Resources	Sub-Districts	Leading Natural Resources
Tanjung Redeb	Mining, plantation, fishery, tourism	Tabalar	Plantation, fishery and marine, non-metal mining materials
Teluk Bayur	Mining, plantation, fishery	Biatan	Plantation, fishery, marine
Sambaliung	Mining, plantation, fishery	Batu Putih	Plantation, fishery, marine
Gunung Tabur	Mining, plantation, fishery	Biduk-Biduk	Fishery, marine, plantation
Kelay	Fishery, mining, plantation and agriculture, forestry	Pulau Derawan	Fishery, marine, tourism, plantation non-metal mining minerals
Segah	Agriculture, plantation, forestry, mining	Maratua	Fishery, marine, tourism, plantation
Talisayan	Plantation, fishery, marine		

Table 4: Economic Base Sector for Each District in Berau Regency

Sub-Districts	Base Sectors	Sub-Districts	Base Sectors
Tanjung Redeb	- Transportation and warehousing - Trade	Tabalar	- Plantation (palm oil)
Teluk Bayur	- Transportation and warehousing - Processing industry (coal and palm oil)	Biatan	- Fishery and marine
Sambaliung	- Coal mining	Batu Putih	- Fishery and marine
Gunung Tabur	- Coal mining - Processing industry (coal and palm oil) - Trade	Biduk-Biduk	- Fishery and marine
Kelay	- Coal mining - Agriculture and plantation - Processing industry (coal and palm oil)	Pulau Derawan	- Fishery and marine
Segah	- Agriculture and plantation - Transportation and warehousing - Processing industry (coal and palm oil)	Maratua	- Fishery and marine
Talisayan	- Fishery and marine - Trade - Processing industry		

Based on Tables 3 and 4, the researchers can formulate vocational programs and areas of expertise needed in each region in Berau Regency. Areas of vocational expertise required in each Development Area Unit (SWP) in Berau Regency are shown in Table 5.

Table 5: Vocational Areas of Expertise Needed in Berau Regency

Sub-Districts	Relevant Vocational Areas of Expertise	Sub-Districts	Relevant Vocational Areas of Expertise
Tanjung Redeb	- Tourism (Hospitality and Tourism services) - Creative arts and industries (craft design and creative products)	Tabalar	- Agribusiness and agrotechnology

Sub-Districts	Relevant Vocational Areas of Expertise	Sub-Districts	Relevant Vocational Areas of Expertise
	- Technology and engineering (mechanical engineering, automotive engineering, industrial engineering) - Mining geology - Business and management		
Teluk Bayur	- Mining geology - Agribusiness and agrotechnology - Technology and engineering (mechanical engineering, automotive engineering)	Biatan	- Maritime (fisheries, fishery product processing, shipping of fishing vessels)
Sambaliung	- Mining geology	Batu Putih	- Maritime (fisheries, fishery product processing, shipping of fishing vessels)
Gunung Tabur	- Agribusiness and agrotechnology - Mining geology - Business and management	Biduk-Biduk	- Maritime (fisheries, fishery product processing, shipping of fishing vessels)
Kelay	- Mining geology - Technology and engineering (mechanical engineering, automotive engineering) - Agribusiness and agrotechnology	Pulau Derawan	- Maritime (fisheries, fishery product processing, shipping of fishing vessels) - Tourism (hospitality, tourism services, culinary skills)
Segah	- Mining geology - Technology and engineering (mechanical engineering, automotive engineering) - Agribusiness and agrotechnology	Maratua	- Tourism (hospitality, tourism services, culinary skills)
Talisayan	- Maritime (fisheries, fishery product processing, shipping of fishing vessels) - Business and management		

The results indicate priority areas in VHS development, including Kelay, Tabalar and Maratua Sub-Districts which require various VHS programs and areas of expertise. The areas of expertise required at Kelay include agribusiness and agrotechnology with agribusiness of estate crops and the processing of estate crops being the programs of expertise. Tabalar needs areas of expertise in agribusiness and agrotechnology with a program of expertise in plant agribusiness and processing of agricultural products. Finally, Maratua requires fields of expertise in tourism with hospitality, tourism services and culinary skills as expertise programs.

3. The need for classrooms and vocational school buildings for the 2024 period is calculated using the parameter projection method with student flow models. The analysis is carried out on a micro per Development Area Unit (SWP) in order to obtain more specific results, which are shown in Table 6, 7 and 8.

Table 6: The Projection of Vocational Needs for Classrooms and Buildings in SWP 1 of Berau Regency

Year	Student Projection	Classroom Needs	Building Investment Efficiency
2019	2490	12	0.004
2020	2671	7	0.005
2021	2712	2	0.005
2022	2798	3	0.005
2023	2906	4	0.005
2024	2997	4	0.005
Total		32	-

Based on the results, the need for classrooms in SWP 1 to 2024 is
32. Annual building investment efficiency will be <1 so it can be concluded that SWP 1 does not require additional buildings until 2024.

Table 7: Projection of Vocational Needs for Classrooms and Buildings in SWP 2 of Berau Regency

Year	Student Projection	Classroom Needs	Building Investment Efficiency
2019	313	-1	0.0006
2020	393	2	0.0008
2021	426	1	0.0009
2022	444	1	0.0009
2023	476	1	0.0010
2024	495	1	0.0010
Total		6	-

The results show that in 2019 there was an excess of 1 classroom. The need for classrooms in SWP 2 until 2024 is a total of 6 classrooms. Meanwhile, building investment efficiency from year to year is <1, thus SWP 2 does not need additional buildings until 2024.

Table 8: Projection of Vocational Needs for Classrooms and Buildings in SWP 3 of Berau Regency

Year	Student Projection	Classroom Needs	Building Investment Efficiency
2019	522	-11	0.0007
2020	508	-12	0.0006
2021	542	-10	0.0007
2022	566	-8	0.0007
2023	590	-7	0.0007
2024	630	-4	0.0008

Based on the results, up to 2024 there will be an excess of classrooms in SWP 3. Therefore, there is no need to build new classrooms in the region within the next few years. The annual building investment efficiency is <1, thus SWP 3 does not require additional buildings until 2024.

This study found the importance of determining vocational expertise in accordance with regional potential . This is consistent with the findings of various studies including Mukhadis, et. al. (2018); Mirza, (2008) and Shaidullina, (2015) as well as Indonesian national policies as set out in the Master Plan for Acceleration and Expansion of Indonesia's Economic Development (Coordinating Ministry for Economic Affairs, 2014) and the National Medium-Term Development Plan 2020 – 2024 (The Ministry of National Development Planning, 2020). Thus, SMK is expected to be able to make a significant contribution to regional development.

The findings corroborate studies that show that the development of VHSs has not yet fully taken into account regional conditions (Syarifah, et. al., 2018). Therefore, the development of VHSs needs to be undertaken through holistic and in-depth studies by focusing on a variety of aspects. Through these steps, it is expected that existing VHSs can make a positive contribution as well as create meaningfulness and usefulness not only for individuals who study in the Institution but to the community and future regional development . The results correlate with the study carried out by NCVER (Garlick, et. al., 2007) according to which VET can contribute to two main areas. Firstly, element of education element of VET has much to offer in fostering regional development in an environment where, in most regions, the potential for growth is not being realised, key metropolitan centres being the exception. The second area where VET could contribute to regional development is through using its connections with business to establish regional coalitions that link regional attributes, objectives, strategies, investment and VET programs to promote human capital development to ensure brighter regional futures.

Therefore, VET courses are designed to develop enterprising skills that need to be closely linked to key regional attributes, strategies and investments and be comprehensive across VET programs. Another aspect that is no less important is the regional management of vocational education (Kamasheva, et. al., 2016). A proactive strategy to prepare vocational education must be in accordance with regional economic growth (Rees, 1997).   Management of vocational education must synergistically involve regional managers, educational authorities, vocational education institutions, business and industry, as well as other stakeholders to ensure the quality of future vocational education,   competitiveness of vocational education and vocational education services (Pugacheva, 2011).

Conclusions

The relevance of vocational programs and expertise in certain regions need to be adjusted to regional potential and local industry needs. Vocational schools that are developed by taking into account these two aspects are more likely to produce graduates who are not only competent in their field of expertise but can also be directly absorbed by the industry around the region. Meanwhile, graduates who do not want to work in the industry can become entrepreneurs according to their respective interests and talents supported by local area potential . Regional potential-based VHSs that are relevant to industry needs are expected to produce graduates who can make a positive contribution to regional development. This is one of the solutions to help overcome the problem of unemployment in the regions.

Based on the results , there are three conclusions or recommendations that can be made. Firstly, based on the analysis using the principal component analysis method, there are three priority areas in the development of vocational schools in Berau Regency. These sub-districts are Kelay, Tabalar, and Maratua Sub-Districts. Secondly, the areas of vocational expertise needed in Kelay Sub-District are 1) agribusiness and agrotechnology with the agribusiness program of estate crops and processing of estate crops; 2) energy and mining with mining geology expertise programs, and 3) technology and engineering with mechanical and automotive engineering programs. Meanwhile, Tabalar Sub-District requires fields of expertise in agribusiness and agrotechnology with a program of expertise in plant agribusiness and processing of agricultural products. Maratua Island Sub-District requires expertise in tourism with hospitality, tourism services and culinary skills as part of the programs of expertise.

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