

The Mapping of Vocational School with Building Technical Drawing Concentration: Opportunities and Challenges in Construction Industry's Needs

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Abstract—In the last five years, the vocational secondary school (SMK) graduates absorption in the industry has been steadily declining. One still remains issues is the incompatibility of graduate competence with the skills required by the industry. The construction industry is one of the industries that should absorb Building Construction graduates, but in reality shows, most of the skilled workers in the industry are not related to Building Construction major. This paper will deliberate a preliminary study on the mapping of the existence of Building Construction vocational secondary school. The aim of this study is to investigate the extent of public interest and the absorption of graduates in the construction industry particularly in a concentration of Building Technical Drawing in West Java. The study employed a survey and interview with 18 vocational high schools in West Java within the major of building Construction which opens that concentration. The result shows the public interest for vocational high school with a concentration of Building Technical Drawing has been increasing in comparison to other concentrations under the same major. This study also figures out that there is a misperception among the parents and the pupils that still occur about the selection of major relating to the employment opportunities in the industry. These preliminary results will lead to a more in-depth analysis of how conformity to the needs of the construction industry can be used as a basis for strengthening competence of the Vocational Secondary school in Building Engineering expertise program.

Keywords—building technical drawing; construction industry; graduate competence; skilled workers; vocational education

I. INTRODUCTION

The construction industry occupies the third position as an economic growth generator in Indonesia after manufacturing and trade sector, according to *Badan Pusat Statistik* Indonesia. This industry is one of the industries that should absorb Building Engineering competencies - vocational secondary school graduates, but most of the skilled workers in the industry are not related to Building Construction major. Data shows the unemployment from Vocational Secondary School graduates reaches the highest rate which was 8.92% in February 2017 [1]. Moreover, the data states that Vocational

Secondary School is the biggest contributor to the number of unemployed in 2017.

Vocational Education focuses on sharpening skill, not only allow students to become proficient but also has the confidence to competently apply it on the job [2]. However, the incompatibility of graduate competencies with the skills required by the industry is still a remaining issue due to a high gap between the competence of vocational graduates and industrial needs. In the last five years, the vocational high school graduate's absorption in the industry has been steadily declining. This situation is also faced by the Vocational Secondary Schools in building engineering major. Many graduates do not have a linear occupation with their educational background. On the contrary, the construction Industries has few workers from Vocational Secondary School especially majoring in building engineering.

This paper a preliminary study of mapping the extent of public interest and the absorption of graduates in the construction industry particularly in a concentration of Building Engineering in West Java Indonesia. This is important to investigate the actual challenges and opportunities faced by the Vocational Secondary School, particularly in majoring Building engineering. This study is expected to become a basis for designing measurable plans to improve the quality of Vocational Secondary School graduates that meet the industry's needs.

II. MATERIAL AND METHODS

A. Participants

This study conducted in eighteen (58%) Public SMK majoring in Building Engineering, in West Java Indonesia. A sample group of this research consists of 582 pupils at 10th-grade particularly in Building Technical Drawing Program, in 2017 academic year.

B. Data Collection

This study was using two kinds of data. The primary data is the response of the chair of program and pupils that were collected through interviews and questionnaire. The secondary data is a document analysis from various related institutions such as from Ministry of education and Culture Indonesia, BPS, and The Directorate General of Vocational Secondary School Development.

C. Data Analysis

Data Analysis was conducted to identify the extent to which the profile and position of Public SMK in West Java Indonesia, factors that influence the selection of majors in high school, and the linkages between graduate competencies and industrial needs. This study was conducted through several phases. The first phase was conducted by interviewing the chair of the study program at eighteen public SMK in West Java. Through descriptive analysis techniques, the output of this phase is the identification of public interest's trend in Building Engineering Program, and which factors cause it. The Second phase was conducted by distributing a questionnaire to 580 pupils at 10th -grade pupils with proportional sampling system. Through Descriptive analysis, the output is regarding the factors that influence the determination of study program selection.

III. RESULTS AND DISCUSSION

A. Profile SMK

There is 2841 Vocational secondary school consist of 287 public schools and 2640 private schools with 15 expertise areas all around West Java Indonesia [3]. One of the expertise areas available in West Java is Technology and Engineering expertise areas consist of 24 expertise program.

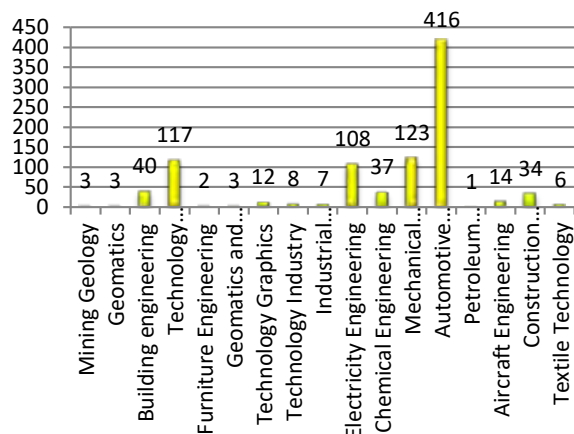


Fig. 1. Building engineering program distribution in vocational secondary school at West Java Province.

Figure 1 shows that Among the Technology and engineering expertise program, building engineering expertise program has only 4.8% or available only in 40 schools all around West Java. Building engineering expertise program has three competencies which are Building technical drawing,

Stone and concrete construction Engineering, and wood construction engineering. Of the 40 Vocational schools that hold Building engineering expertise program.

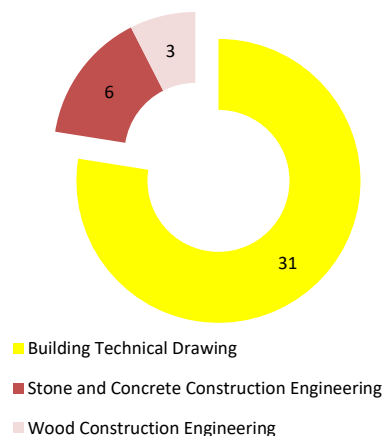


Fig. 2. Public vocational school with building technical drawing competencies at West Java Province.

From the 40 Vocational schools that hold Building engineering expertise program, building technical drawing competencies are held in 77.5% or 31 schools, while other competencies only exist in 22.5% or less than 10 vocational schools at West Java as shown in Figure 2.

B. Public interest to SMK

Figure 3. shows the number of registrants has increased in the last three years. This is happening in 84% Public SMK. Meanwhile, 16% had a decreasing number of the applicant. The increase caused some of them to limit the number of applicants received due to limited facilities.

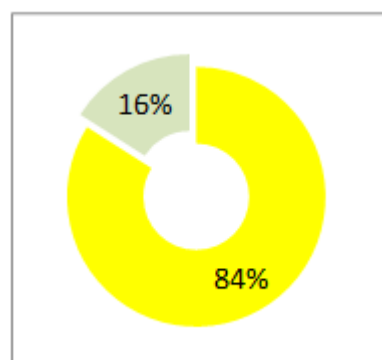


Fig. 3. The public interest in building technical drawing competencies at 2017.

However, this increase of applicant in Building Technical drawing program was only at 10.62% far below another program in the technology and engineering field, such as mechanical engineering which reached an average of 26,70% and electrical engineering averaged of 73,91% in 2017 [3].

There are four major factors influenced the student's preferences about the program study selection according to the interview result, they are the employment prospect, economic condition, Location, and School quality.

1) *Employment prospect*: There is a missed perception among the students and their family about the employment prospect for building engineering graduates. Comparing to others program in Technology and engineering field, the occupation for building engineering graduates are often associated with a rough worker (kuli Bangunan) which has the lowest level of occupation obtained for vocational secondary school. This perception occurs especially in industrial areas such as Kabupaten Karawang. In Industrial areas, working as laborers at large-scale factories is considered more proud than being a laborer or construction worker. The levels of occupational security and prestige in each type of employment are still played as an important role for society [4].

There is also a misperception about a construction worker that doesn't need a formal education in order to gain the skill. This misperception through pupils and their families is due to a lack of information regarding the program. Therefore, the level of parents trusts to enroll their children in the building engineering program at Vocational secondary school is low due to the employment prospect after graduation. To ensure that students and their families make a right decision based on a good quality information is very essential [5]. The Information, among others, what graduates do regarding employment, further studies, and labor market relevance of programs is very important to create a good basis to help pupils and their families choosing a right programed for them [5]. The result shows that schools with increased applicants are those who inform the success of their graduates.

2) *Socio-economic status*: Vocational education and training (VET) undertaken as part of secondary schooling or its equivalent is one of the major strategies that country education systems use to promote this goal which is equipping young people with the knowledge and skills that they need for employment. In many situations, it complements the skills, experience, and work ethics that young people gain from part-time, vacation, or voluntary work [6]. According to the interview, the main consideration of parent to have their children enroll a vocational secondary school is there is hope of working immediately after graduating from school. As the data show that as many as 56.8% of parents' incomes is less than 2 million Rupiah per month or nearly US\$ 143 per month in current currency. While the type of work of the majority of parents is labor and non-permanent workers as much as 40.2%, with the final education of the majority of parents at the high school level of 42.3%. The data reinforces the statement that one of the strong reasons for deciding on school selection is based on the family's economic background. Student from poor families is more likely to pursue a vocational education than otherwise identical students [7]. Parent send their children to Vocational Secondary Schools in the hope that after graduation they will be ready to work and ease the burden on them.

3) *School quality*: The last factor is the school reputation/quality which consists of two sub-factors, student achievement and completeness of school facilities. Trends in public interest are increasing in regions that have vocational schools with student achievement at local and national levels. This has happened to SMK 1 Cirebon which is known to have many achievements. The impact of the public interest that increases from year to year is by limiting the number of students who are accepted related to the availability of facilities they have. This is done in an effort to maintain the ratio of facilities to the number of students staying balanced, which in turn will maintain the quality of the teaching and learning process. Facility Completeness also supports the increasing trend of public interest, especially the availability of school infrastructure. The school building is the main observation for parents of prospective students and the general public in determining the choice of expertise programs. Its about 61.50% pupils state that school choices were determined based on School facilities and pupils, achievement.

C. The Need for Skilled workers in The Construction Industry

The decline in the absorption of vocational secondary school graduates in the industry in the last five years illustrates the many aspects that need to be addressed in the provision of education that prepares a skilled workforce ready for work. On the contrary, the changing labor market dynamics indicate a change in employment of vocational graduates in industries that are in line with their fields. The level of employment of graduates in the level of secondary education (SMA and SMK) in the last 15 years shows a change although not significant. If in the first 5 years, from 2000 to 2005, the absorption of vocational school graduates is higher than high school graduates. However, in 2010 to 2015, conversely, the absorption of high school graduates was higher than that of Vocational Schools (Exposure to data and analysis on Revitalization of Vocational Education, Ministry of Education and Culture) [9].



Fig. 4. The employment dynamics of Vocational Secondary School (SMK) and High School (SMA) graduates.

Further analysis shows that the decrease of Vocational school graduates is influenced by at least three factors. (1) 21st Century skills require more logical thinking skills above the

skills to make goods and services. The first area of 21st-century skills is critical thinking and problem solving (also called expert thinking), communication and collaboration, and creativity and innovation [10]. Thinking skills needs in job duties of TVET qualification acquired in work progress in form of mental activity such as observation, judging, inquiring, imagining, remembering, wondering, evaluating, and interpreting [11]. (2) the excess supply of vocational school graduates due to reversing the ratio of high school policy which is, 30:70 for Vocational School. (3) While there is a shift need in the industrial world that emphasis on logical abilities, the graduates still not even ready to use in the industrial world. The business world needs a workforce that can adapt to the rapid changes that need to be made efforts to provide sufficient supplies in the formal education process [12].

The employment condition in the industrial world is more pronounced in the construction industry job market. The graduates of building engineering vocational school have not been able to occupy as skilled workers in the construction industry. Culturally, the people who send their children to Building Engineering Vocational Schools do not want their children to be laborers or construction workers, but they are expected to be supervisors or builders. Construction workers are still considered a rough job that does not have to go through formal education to get his skills. Therefore, it is rare for graduates of Building Engineering Vocational Schools to become skilled workers in the construction industry. Knowledge and skills acquired in vocational schools are not directly used as skills in working in the construction industry instead of functioning as knowledge in leading and translating drawings to construction workers/ laborer.

The learning process and skills obtained by building engineering vocational school graduates realistically different from any major programs such as electrical, mechanical, or automotive engineering. For other study programs, the skills acquired at school can be directly used in related industries. A different situation is faced by a building engineering graduates. The provision of skills acquired in school cannot directly make them skilled workers in the industry. The construction industry is still occupied by construction workers who get the skills from their predecessors and the length of work experience.

In its development, the Building Engineering Vocational School is divided into several concentrations which can be different in each school. The concentration of Building Technical Drawing (TGB) and Mapping Survey are concentrations in which graduates' skills can be used directly by the manufacturing industry. Building Technical Drawing concentrations occupy positions as a drafter in architectural consultants, while Mapping Survey works more in infrastructure such as measuring roads, bridges or other land works. Meanwhile, the concentration of Building Construction that provides graduates with woodworking, stone, concrete and construction skills is largely not absorbed into skilled workers in that field.

Basic knowledge and skills gained in formal education are the basis for developing advanced skills especially in responding to the development of new technologies in the building construction. Construction workers involved in

various large-scale urban projects experience the learning process and transfer of new technology directly from the producers of building materials. The introduction and response to the new technology have indirectly increased their ability to work.

However, the development of the construction industry with increasingly complex work skills needs, cannot be completely left to the craftsmen to learn for themselves. Diverse academic backgrounds are the basis for developing further skills. The policy of developing vocational education in the future is not only directed at formal education or vocational school. But skills training institutions organized by related parties, both government and private institutions including universities, will be more effective in eliminating the gap between the conditions of construction workers and the demands of modernity in the construction industry.

IV. CONCLUSION

The documentary analysis shows that The number of Building Engineering program in Public Vocational School is far below another program in Technology and engineering expertise areas, meanwhile Building Technical Drawing concentration has a dominant number in Building engineering program. The result also shows that Public interest in study program selection is strongly influenced by the image of a graduate's occupation and economic condition including a school location. While school quality and location have less influence on the choice determination. A continuous increase in public interest is an opportunity for vocational schools as a sign that the program is still in demand by the public. However, increasing public interest in this program must also be continued with various efforts to improve the quality of graduates who can compete in the face of the challenges of working in the 21st century. The Efforts to improve graduate competence will have a direct impact on increasing public interest in study programs that will simultaneously reduce unemployment rates from vocational schools. Further exploration is needed to examine how the Building engineering program in Vocational school have an attachment to the construction industry that has a dynamic movement. Further experimental and descriptive research is needed in designing measurable plans to improve the quality of Vocational Secondary School graduates that meet the industry's needs.

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