

What are the Dominant Factors of Students' Productive Skills in Construction Services?

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Abstract. The purpose of this study to determine the dominant factors of students' productive skills in doing the work of concrete structures that fit the needs of construction services. Sample of the respondents is vocational high school students from several districts and cities in North Sulawesi, Indonesia. Data are obtained through the performance test instruments of student. Whereas, data analysis is performed using factor analysis. The result of this research show the dominant factors of the students' productive skills in doing the work of concrete structures that is according to the need of construction services, namely: (a) factor the working of concrete casting consists of making scaffolding from good materials and conducting concrete casting according to working method; and (b) factor the working of concrete reinforcing consists of read the working drawings for concrete reinforcement and make the concrete formwork from good material. Some of the respondent's students in doing some concrete structure work have done well, but not yet according to working drawings, working methods and technical specifications of the work. The learning is done in accordance with the competency-oriented school curriculum but the teaching materials given have not been maximized in accordance with the needs of productive skills required construction services industry. The results have an impact on the low absorption of graduates in the implementation of the construction services industry.

1. Introduction

The need for skilled students as graduates of vocational high school (SMK) of competency in stone and concrete engineering skills (TKBB) will be greater in line with government policy to improve sustainable infrastructure development. Graduates of SMK TKBB are expected to fill positions in jobs as skilled workers in the implementation of construction services as operators or implementers on building work. This means that students of SMK must have a standard of work competence with adequate skills in doing the job according to field of expertise. Thus, students must equip themselves with job skills in the implementation of building work with various elements of building work. Construction of buildings in the construction process has several elements of work that are integrated in the overall construction of buildings [1, 2].

The competence of skilled workers is reflected in the Indonesian national working competence standard (SKKNI) on the job of implementer of building work [3]. The competence is described in several units of competence, namely: (a). Carry out preparatory work, (b). Carry out foundation work, (c). Carry out structural work, (d). Carrying out architectural work, and (e). Create a job



implementation report. For each unit of competence, it consists of several elements of competence and performance criteria. Assessment for each of these competencies should be consistently disclosed in 3 (three) aspects, namely aspects of knowledge, skills and attitudes. Furthermore, it is mentioned in the Indonesian National Qualification Framework (KKNI) [4] that SMK graduates are equivalent to level 2 (two) levels, with job description: (a). Be able to perform a specific task, using commonly tools, use information, work procedures, and demonstrate performance with measurable quality, under the direct supervision of their superiors; (B). Have basic operational knowledge and factual knowledge of specific work areas, so as to be able to choose available solutions to common problems; And (c). Responsible for the work itself and can be given the responsibility of guiding others.

Skills are defined as the students's ability to think and act effectively and creatively in the abstract and concrete area as a development from those studied in schools independently. Students' skills are directed at the ability to observe carefully, imitate activities, adapt (imitate by making adjustments), organize or shape, work according to procedures, work meticulously, work naturally [5]. Skills to be one aspect of the formation of competencies directed at the development or mastery of certain skills. Skills are an important aspect for skilled workers or construction personnel, so that students who are prepared to become skilled workers or executing personnel must equip themselves with skills in the field of expertise. The importance of skills for a workforce becomes the basis of the workforce's success in carrying out its work tasks, because a construction project will be successful if it is done by skilled and trained workers [6]. Skill aspect is an aspect that is gained or obtained by the worker in this case the students such as working atmosphere at work place. This is in line with Willert, etc [7] that students will succeed with real skills like at real work. The skill aspect refers to the ability to perform work under various conditions and possibilities [8]. It is further stated by Maclean and Wilson [9] that the skill aspect is one of the standards required to demonstrate competence. Thus, it can be stated that any skilled workforce will always succeed in such work in carrying out a construction project.

The work skills provided to students in schools are still considered not appropriate or relevant to the needs of the construction industry. Some of the skills competencies given through the subjects in school, it has not fully accommodated all the needs of productive competence of construction services. There are several skills required in the field of construction work, but have not yet been presented in the skill competency documents issued by schools [10]. The relevance of the skills of vocational students in Indonesia to the needs of the business world and the industrial world tends to be low [11].

Students of SMK TKBB who have skill according to field of expertise at job position of building worker, can be seen on work competence unit that is dimension of foundation work and concrete structure work. According to the curriculum structure of SMK, the subjects are divided into three groups, namely normative subjects, adaptive subjects, and productive subjects. Productive subjects equip students with the mastery of productive skills that refers to the minimum standard of work skills applicable in the world of work. The purpose of this study to determine the dominant factors of students' productive skills in doing the work of concrete structures that fit the needs of construction services.

2. Methods

This research uses quantitative research approach. The sample of respondents are students of SMK TKBB taken from several vocational schools in North Sulawesi. The total population of students of SMK TKBB in North Sulawesi in 2016 only amounted to 107. The distribution of students of SMK TKBB was in a wide area, then the sample was taken randomly using Yamane formula [6, 12] with 10% error rate obtained 52 samples of students. This research instrument uses the performance test given to the students. The performance value of the student is focus on 5 types of work: making scaffold, assemble of concrete reinforcement, making of concrete formwork, installing of concrete reinforcement, and concrete casting. The research instrument was developed from theoretical reference and adapted to SKKNI. According to the purpose of this research, the data analysis use factor analysis with the principal component analysis method and varimax rotation method to get the value of communality and eigenvalues. The use of factor analysis is intended to obtain a minimal factor with a

simple principle that can generate correlation between indicators measured [13]. The value of communality and eigenvalue obtained by testing the data feasibility requirements first through the value of KMO (Kaiser-Meyer-Olkin Measure of Sampling) and MSA (Measure of Sampling Adequacy).

3. Results and Discussion

Based on the data obtained shows that the range of scores obtained by students through the performance test instruments of students' productive skills on the work of concrete structures is relatively vary from minimal score to maximal score. Some respondents showed performance results that had relatively high levels of skill in performing concrete structure work. When viewed from the score of student achievement of respondents through the scale of the value of performance, it can be seen that most students of respondents showed excellent score on performance assessment. But the findings of the study showed that there were 1,92 percent of the respondents gave unfavorable scores on some focus on performance assessment. This indicates that there are some of the respondent's students in performing some concrete structure work such as making scaffold, assemble of concrete reinforcement, making of concrete formwork, installing of concrete reinforcement, and concrete casting have been done well, but not yet fit working drawings, work methods and job technique specifications. This is supported by preliminary survey results, limited observations and interviews with some vocational teachers and construction service providers that learning in school has been in accordance with the competency-based curriculum but found some work competence has not maximally accommodate the needs of construction services. This is in line with Sutrisno, Dardiri and Sugandi [10] stating that there are some productive competencies required in the field of construction work, but not yet presented in the school curriculum documents. The learning is done in accordance with the competency-oriented school curriculum but the teaching materials given have not been maximized in accordance with the needs of productive skills required construction services industry. The results have an impact on the low absorption of graduates in the implementation of the construction services industry. Therefore, the implementation of vocational education in all building engineering programs must always be dynamic and in accordance with the standards of job skills required by the construction services industry.

According to the purpose of this study, then based on the data obtained conducted factor analysis. After testing the feasibility of data obtained KMO value greater than 0.5. Furthermore, the MSA value is calculated for each instrument component, and the value of all instrument components is greater than 0.5, it can be stated that the available data is feasible to be analyzed through factor analysis. After the process of factor extraction with the main component analysis method, the value of communalities of students' skill in performing the concrete structure work (see Table 1) is sorted from the largest value to the smallest values.

Table 1. Communalities value.

Instrument components	Communalities value
Read the working drawings for concrete reinforcement	0,722
Make the concrete formwork from good materials	0,521
Make scaffolding from good material	0,436
Implementing of concrete casting in accordance with the work methods	0,387

Based on the value of communalities in Table 1, then the factor rotation. Factor rotation stage is done with the aim to find the factor that is able to maximize the relationship between indicator component of student productive skill variable. Furthermore, the result of factor rotation gives eigenvalue of student skill in doing concrete structure work, as given in Table 2.

Table 2. Eigenvalue.

Instrument components	Eigenvalue
Make scaffolding from good material	2,110
Implementing of concrete casting in accordance with the work methods	2,110
Read the working drawings for concrete reinforcement	1,138
Make the concrete formwork from good materials	1,138

Based on the eigenvalue in Table 2. obtained after the factor rotation, then from the instrument component can be formed two factors, namely: (a). Factor 1 or the factor of concrete casting consists of: making scaffolding from good materials and conducting concrete casting stages according to the working method; and (b). Factor 2 or the factor of concrete reinforcing consists of: read the working drawings for concrete reinforcement and make the concrete formwork from good material.

The results of this study reveal the dominant factors of students' productive skills in doing the work of concrete structures according to the needs of construction services. Through the results of this study also revealed that students as candidates for skilled workers or implementers must have minimum standards of skills in the work of concrete structures include the standard skills of concrete reinforcing consists of components of the work of installing concrete reinforcement in accordance with the working drawings, the assembling of concrete reinforcement in accordance with the working drawings, and make the concrete formwork from good material. This is in line with the results of study by Almira et al [14] that the students' productive skills of SMK TKBB that the construction industry needs are skill in drawings, structural work and installation of scaffolding. Therefore, the aspects of productive skills in the work of concrete structures are important for students' success in their work projects. As mentioned by Pavlova [15] that skills are key to the student's performance that industry expects as in the implementation of construction services.

The students' productive skills in carrying out the concrete structure work is important to be mastered by the students as the basic capital to do the job task according to the competence of the skill. Because with good skills the students become competent and expert in their field, as mentioned by Winterton, et al [16] that skill can lead to performance with accuracy and speed in work. Also mentioned by Winch [17] that productive skills learned make the worker can act in a certain way in relation to tasks. Therefore, the skills become important so that the students as a candidate skilled personnel to be competent and expert in the field of expertise.

The importance of skills for a workforce is the basis of the success of the workforce in carrying out the work tasks, as Elfaki and Alatawi [6] notes that a construction project will success if it is done by skilled and trained workers. Because the skill aspect is an aspect gained by the workforce in this case the student is like a workplace atmosphere on real work, as Willert et al [7] mentioned that students will succeed with real skills such as workplace. Thus, it can be stated that any skilled workforce will always succeed in such work in carrying out a construction project.

4. Conclusions

The result of this research show the dominant factors of the students' productive skills in doing the work of concrete structures that is according to the need of construction services, namely: (a) factor the working of concrete casting consists of making scaffolding from good materials and conducting concrete casting according to working method; and (b) factor the working of concrete reinforcing consists of read the working drawings for concrete reinforcement and make the concrete formwork from good material. Some of the respondent's students in doing some concrete structure work have done well, but not yet according to working drawings, working methods and technical specifications of the work. The learning is done in accordance with the competency-oriented school curriculum but the teaching materials given have not been maximized in accordance with the needs of productive skills required construction services industry. The results have an impact on the low absorption of graduates in the implementation of the construction services industry.

The results of this study reveal the students' productive skills in doing the work of concrete structures according to the needs of construction services is the work of concrete casting consisting of making scaffolding from good materials and conducting concrete casting stages according to the working method. Through the results of this study also revealed that students as candidates for skilled workers must have minimum standards of skill in the work of concrete structures that is the work of concrete reinforcing consists of reading working drawings for concrete reinforcement and make the concrete formwork from good material.

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