

# Dominant Factors of the Knowledge Competency of Vocational High School Students According to the Need of Construction Services

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**Keywords:** Relevance of Student Knowledge, Vocational Education, Construction Services, Concrete Construction, Shallow Foundation Construction, Students Knowledge Competency.

**Abstract:** The purpose of this study was to find out the dominant factors of the knowledge competency of Vocational High School (VHS) students in carrying out shallow foundation construction work that was under the needs of construction services. Respondents of this study were VHS students in North Sulawesi Province, Indonesia. The instrument of this research is a test instrument on work knowledge competencies given to students as respondents, with three work indicators, namely preparation of locations, preparation of foundation profiles, and implementation of foundation construction work. Data analysis using factor analysis techniques with the principal component analysis method and the rotation process used the varimax method. The results of this study indicate that there are two dominant factors in students' knowledge competency in carrying out shallow foundation construction work that fits the needs of construction services. *The first factor* is the knowledge factor of the technical specifications of the foundation, and *the second factor* is the knowledge factor of the foundation pair profile. The contribution of this study is to show data as a result of research on the dominant factors of work knowledge competency of VHS students who have conformity with the needs of construction services.

## 1 INTRODUCTION

Data on Indonesian workforce as of August 2018 shows that the open unemployment rate according to education is dominated by graduates of Vocational High Schools (VHS), which are 11.24% or 7 million of the total open unemployment (BPS RI, 2018). Furthermore, the 2018 data on employment in the construction sector requires 8.3 million people, and of that amount around 80% or 6.64 million people should be filled by VHS graduates, and only around 20% or 1.66 million people are filled by college graduates as experts (Kementerian PUPR, 2019). Data on labour requirements in the construction work sector shows that there are great opportunities for students as VHS graduates to be absorbed in all fields of construction work. VHS students are prepared to become job executors, including construction work. VHS students are prepared to have adequate work knowledge competency standards in carrying out work according to their field of expertise. This is in accordance with the aim of organizing VHS to become schools that prepare students to become graduates who are ready to work.

But it becomes a question mark why many VHS graduates are still unemployed. This is due to the fact that VHS graduates as job seekers do not yet have work competencies that are in accordance with the needs of the construction service industry (Kementerian PUPR, 2019). The work competency that must be possessed by students as prospective vocational graduates is a combination of several aspects. Knowledge is one of the important aspects needed to show one's competence (Maclean and Wilson, 2009).

Knowledge competency is defined as the ability of vocational students who have factual, conceptual, procedural, and metacognitive knowledge in science, technology, art, and culture with insight into humanity, nationality, statehood and civilization related to the causes and effects of phenomena and events (Permendikbud, 2013). Knowledge is one of the dimensions of competency formation for each individual to do a particular job according to his field of expertise. Knowledge is the foundation needed by competence. Knowledge becomes the central dimension of a competency that is combined with the dimensions of the skills and experience that

a person needs to perform a particular task (Weinert, 1999; Succar et al., 2013). This means that knowledge can be a basis for someone to be able to adapt to work. Knowledge can also be a basis for someone to take the initiative in every job. Knowledge can be the basis of one's understanding in order to be able to understand the world of work.

Work knowledge given to students in schools is still considered not appropriate or not relevant to the needs of the construction services industry. Some of the competencies of knowledge provided through subjects in schools have not fully accommodated all the needs of work knowledge competencies in the implementation of construction services. Competencies given at Vocational Schools in Indonesia, their relevance to the needs of the industrial world tend to be low. Some vocational program fields fall into the irrelevant category (Safitri et al., 2012). The suitability or relevance of vocational education with the needs of the workforce has not been maximized. The mismatch between the world of work and the quality of vocational school graduates is one of the factors that drives the low absorption of vocational graduates in the implementation of construction services. The purpose of this study was to find out the dominant factors of knowledge competency of VHS students in shallow foundation construction work according to the needs of construction services. The contribution of this research is to show the data as a result of research on the dominant factors of work knowledge competence of vocational students who have conformity with the needs of construction services.

Construction services businesses in North Sulawesi continue to show the dynamics of development, along with efforts to develop infrastructure in various fields. A fact that took place in North Sulawesi in the implementation of construction services was in desperate need of labour, but still more was imported from outside North Sulawesi (Wowor et al., 2013). This is important because in North Sulawesi Province there are several relatively new districts, which are continuously developing infrastructure as community service facilities, as well as the dynamics of housing development that is so rapid in order to meet the needs of the community. The need for labour in construction projects in North Sulawesi continued to increase essential to support the success of the construction business (Tumelap et al., 2014; Wowor et al., 2013). Thus the need for vocational graduates in North Sulawesi is an important and urgent matter for vocational education in producing

workers who have competencies relevant to the needs of construction businesses, to meet the needs of North Sulawesi and not imported from outside the region.

## 2 RESEARCH METHODS

### 2.1 Research Design

This study uses a descriptive quantitative research approach, where quantitative data is obtained through the test instrument was given to respondents. The instrument was developed from the results of focus group discussion (FGD) with the actors of construction services and adjusted with the Indonesian National Work Competency Standards (SKKNI) and the *Indonesian Qualifications Framework* (KKNI).

### 2.2 Population, Sample and Respondent

The respondents of this study were Vocational High School students, Building Engineering Programs. They are taking VHS students as respondents, intended to obtain data about the dominant factors of student work knowledge competencies that students have gained through the learning process in school. Students used as respondents are students who have finished taking productive learning programs. The VHS population in North Sulawesi is in a large area, so only 4 VHS are taken from 3 regencies or cities. The number of student respondents was 52 people obtained through random sampling techniques using the formula from Yamane (Singh and Masuku, 2014; Israel, 2012). Furthermore, respondents in the element of construction services are representatives of 5 construction service companies listed in the LPJK (Construction Services Development Board) of North Sulawesi, who carry out construction work in the North Sulawesi and surrounding provinces. Respondents from construction service actors are intended to get a description of the data on the needs of workforce of VHS graduates with relevant work knowledge competencies.

### 2.3 Data Collection

This research data was obtained through test instruments given to respondents. The provision of test instruments is given by giving directly to respondents at school. Furthermore, the test

instrument was collected and continued with the tabulation of data to assess the achievement score of each item in the test instrument on each indicator of work knowledge competence.

## 2.4 Research Instruments

The need of students knowledge competency from the construction services is illustrated in the research instrument with three work indicators in construction work, namely preparation of locations, preparation of foundation profiles, and implementation of foundation construction work. Each work indicators has several items in the work description that are developed based on the FGD results with the actors of construction services but also adjusted to the SKKNI for VHS students

## 2.5 Analysis of Research Data

The data analysis in this study used factor analysis techniques, with the principal component analysis method, and the varimax method was used for the rotation process. The stages and procedures for calculation in factor analysis, namely: calculating the correlation matrix, factor extraction and factor rotation (Tabachnick and Fidell, 2014; Widarjono, 2015). Before the analysis was carried out, the results of the research data were processed and tabulated from the research instrument with scores of the research respondents, in the form of data on the achievement of each work knowledge indicator

## 3 RESULTS AND DISCUSSION

Student work knowledge competency data is obtained through written test instruments on the dimensions of shallow foundation work where the dimensions of the shallow foundation work are measured by three indicators, namely; the preparation of the location; preparation of the foundation profile; and execution of the foundation construction work.

Furthermore, the research data is analyzed using factor analysis techniques with the principal component analysis method, and the varimax method is used for the rotation process. According to the factor analysis procedure, the analysis is carried out in three stages. Namely, the first stage calculates the correlation matrix, the second stage calculates factor extraction, and the third stage calculates the factor to calculate or look for factors that can optimize the relationship between the instrument

components. In the process of data processing to find out how the instrument components in the knowledge variable can explain the factors formed, the values of communal and eigenvalue are used.

Based on research data analysis with factor analysis techniques, obtained eigenvalue through factor rotation, then formed two dominant factors of student work knowledge competence, with details for the first factor has an eigenvalue of 3.088 and the second factor has eigenvalue 1.174. These factors are the first factor is the technical specification of shallow foundation, with details of work is making soil excavation according to work drawings, choosing the size of river stone as one of the ingredients for making foundation pairs, and determining river stone foundation as a kind of shallow foundation. The second factor is the work factor of shallow foundation pair profile, with work details is to make bow plank as a guess board for benchmarking soil excavation, making profile pairs as a benchmark for location and position of the foundation, and determining the location of the measurement points for excavation.

The results revealed that the work knowledge competence of foundation construction that had been obtained by students in Vocational High School, it turns out that its suitability was dominated by two main factors, namely the knowledge factor of the technical specifications of the foundation and the knowledge factor of the foundation pair profile. The level of good work knowledge about foundation work, it is important to attempt to understand each work in accordance with existing work competencies. So that with good work knowledge competencies, it will be able to lead to good construction work patterns. Knowledge becomes important for the workforce in ensuring the accuracy and success of construction work and can understand the relationship between various parts of the work (Elfaki and Alatawi, 2015). Knowledge aspect is important in understanding the situation and characteristics of work in the field of engineering construction (Zhu and Zhang, 2012). Thus, it can be stated that competency expertise in aspects of work knowledge is important in understanding the implementation of work and carrying out construction work, especially shallow foundation construction work.

The importance of knowledge for every workforce such as students who are prepared to become skilled labor or implementing personnel, is the basis for understanding work according to work competencies. This is in line with Maclean and Wilson (2009) that knowledge is the basic or

important standard needed to demonstrate competence. The competency knowledge is needed to work in certain jobs according to the field of work expertise (Kehinde and Adewuyi, 2015). This study shows that vocational students who have gone through the vocational learning process will get the provision of work knowledge competencies that are following the standards of the construction service industry. Because, vocational education is always and should follow the dynamics of developing existing work standards (Akkerman and Bakker, 2012), student competence will be of good quality if developed through vocational education such as in the workplace (Aarkrog, 2006). Knowledge competencies obtained from vocational education are a reflection of work experience from the school environment (Rauner et al., 2013). Thus, work knowledge becomes an important element for every workforce to be able to work in a workplace well according to their expertise.

## 4 CONCLUSIONS

The work knowledge competence of shallow foundation construction that has been obtained by students from vocational high schools, it turns out that the level of conformity is dominated by two main factors, namely the knowledge factor of the technical specifications of the foundation and the knowledge factor of the foundation pair profile. The dominant factors of student work knowledge competency, obtained from three work indicators, namely: (a) location preparation; (b) preparation of foundation profiles; and (c) implementation of foundation construction work.

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