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The Study of Vocational Higher Education Graduates Skills Which Requires in The Industry

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The Study of Vocational Higher Education Graduates Skills Required in the Industry aims to elaborate the occupation of the vocational higher education of civil engineering graduates in industry; and describe the technical and employability skills of the graduates' demands in the construction industry. This study is a quantitative research. The subjects were all of VHE of civil engineering Department in Makassar city who had graduated the last 5 years. Samples were taken using purposive sampling amount 32 people. Research variable were occupation of the graduate, and technical and employability skills of the graduates. Data collected using questionnaires and structured interviews. Analysis data used descriptive analysis. The results showed that: (1) the occupation of the D3 civil engineering graduates in industry are: field officer, quantity, quality control, administrator, surveyor, and technician; (2) The industry requires technical skills of the D3 Civil Engineering graduates including: understanding of the field of employment, mastery of the technique of digital drawing, understanding of the cost analysis, document management, technical understanding of applying and supervision, making work report, correcting errors, operating and maintaining equipment, and evaluating the work; and (3) The industry demands employability skills including the ability in: communication, working in teams, problem solving, self-management, planning and management, information technology and communication, lifelong learning, and initiative and enterprise.

Keywords: Vocational Higher Education, Civil Engineering, technical skills, employability skills

1. INTRODUCTION

Various stakeholders such as the world of work, students, schools and communities have a different perspective on the notion of vocational education, place of learning, and learning process in vocational education¹. Skills and competencies outcomes are still not clearly understood widely by all stakeholders². This difference raises the gap between learning at school and the workplace that needs to be given a bridge to synchronize the competence³.

⁴ stated that the competency is the ability to carry out a complex task that requires the integration of knowledge, skills and attitudes. ⁵ argue that the graduates of 11 engineering major rated a top cluster of competencies (teamwork, communication, data analysis, and problem solving) significantly higher than a bottom cluster (contemporary issues, design of experiments, and understanding the impact of one's work). Graduates across engineering discipline share a pattern of importance for professional practice among the Accreditation Board for Engineering and Technology

(ABET) competencies that statistically significant, consistent across demographic variable, and stable over time. This pattern can inform faculty decisions about curriculum emphasis within and across engineering disciplines.

The curriculum which designed without need assessment in the workplace will impact to the mismatch competency of the graduates. Many graduates are not absorbed in the workplace can be caused by the quality of teaching and learning process. The relevance of vocational education is not only caused by the gap between the supply and demand but also can be caused by a lack of curriculum content accordance with the demands of the workplace, the development of science and technology and economic development⁶.

Competencies of learners are declared in the curriculum. The curriculum of vocational higher education (VHE) of civil engineering department has been developed and could be revised based on the consideration of the needs and the growth in the world of

23

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work. ⁷ explain that at the Georgia Institute of Technology, the process of civil engineering undergraduate curriculum revision includes a variety of input from the user especially the construction industry. The curriculum emphasizes the system of civil engineering, technical communication, sustainability, and the analysis and design of computer based. In addition, the curriculum revision also effort encourage learners to continuing study to master degree and use of distance learning technologies as a basis for learning.

Graduates of VHE of civil engineering department are supposed to have the ability in planning civil construction, structural drawing, calculation of budget plans, technical specifications, preparation of tender documents, as a laboratory staff, supervisors of construction services in civil Engineering in the construction of facilities and infrastructure, as well as the ability to build real estate. This gap supported the data from BPS which recorded a total number of unemployed nationally in February 2016 reached 7.02 million people or 5.50% of total labor force. Of that number, vocational school graduates have highest unemployed amount 9.84%, followed diploma education at 7.22%, Senior high school at 6.95%, and 6.22% of university graduates ⁸.

Therefore, this study aims to elaborate the occupation of the vocational higher education of civil engineering graduates in industry; and describe the technical and employability skills of the graduate demands in the construction industry.

2. RESEARCH METHOD

This study is a quantitative research. The population of the study was all of VHE of civil engineering Department in Makassar city who had graduated the last 5 years. The sample was taken using purposive random sampling and conducted 32 graduates as respondent. The variable of the research were an occupation of the graduates, and technical and employability skills of the graduates. The data was collected using questionnaires and structured interviews during February to May 2016. The collected data was analyzed used descriptive qualitative and deep discussion.

3. RESULT

Graduates of VHE of Civil Engineering Department has employee in various areas of work. Their job generally in the contractor company (category large, medium, and small) with a total of 35%; in the developer company (category large and medium) with a total of 20%; in the consultant company (category large) about 10%; civil servants 10%; other works (financing, further studies, and marketing) about 10%, as an entrepreneur about 5%, and unemployed about 10%. The contractor, the consultant, and the developer company area include to construction industry and totally graduates who work on it amount 65%.

Graduates who work in the construction industry was purposed to describe more about their occupation. It will elaborate the occupation, the duty and the competency in the workplace as they work now. For more clearly, it describes at Table 1.

Table 1. Occupation Frame of the Civil Engineering Graduates

No	Occupation	Duty	Competency
1	Field Officer	Monitoring the worker activities in the project Managing the workers duty in the project Managing the needs of the tools and materials in the project Managing the working time of the project Make a daily report Make a monthly report	Ability to read and understand the shop drawing Ability in the construction management Ability to analyze and report the activity and the result of the project Ability to operate the technology tools based on standard operational procedure
2	Quantity	Count the needs of the tools and materials Count the realization of the tools and materials has used Count the realization of the working project Make a report	Ability to analyze and report the project data Ability to operate the technology tools based on standard operational procedure
3	Quality Control	Control the quality of the tools and materials Monitoring the quality of the project result Make a report	Ability to analyze and report the result of the project data Ability to operate the technology tools based on standard operational procedure Ability to measure the quality standardize
4	Administrator	Managing the pre-qualification document Managing the tender document Make an implementation project report	Ability to read, understand, and organize the document according to norm, standard, guide, and manual set

5	Surveyor	Identified the tools and materials needed in survey Collecting data in the field by survey Drawing the result of the survey data	Ability to read and understand the document Ability to operate the survey tools Ability to analyze the data Ability to draw the analyzed data
6	Technician	Identified the tools and materials needed Used the tools as function Calibrate the tools Testing the quality of the tools and materials Take sampling in the field Make a report	Understand the used and the maintenance of the tools Understand the characteristic of the tools and materials Understand SOP Ability to report the result of the works

The Table 1 as shown, there are 6 (six) occupations area of the VHE of civil engineering department graduates. Field officer, quality control, administrator, and surveyor are the occupations which related to consultant, contractor and developer; while quantity and technician are the occupations which related to contractor and developer. The duty is the main job of the employee in the workplace. This job related to the activity that they always do continuously every day. Therefore, in order to have an occupation at the workplace, graduates must have a competency which describe above.

The skills of the graduate⁸ which explore in this research are technical and employability skills. The technical skills related to the occupations in the construction industry, while employability skills (ES) also related to other industry or another workplace of the graduate occupation.

Table 2. The skills demand in the workplace

No	Technical skill	Employability skill
1	Understand works subject	Communication
2	Drawing with computer base	Team work
3	Analyze budget	Problem solving
4	Document management	Self-management
5	Applying / Monitoring	Planning and organizing
6	Reporting	Technology
7	Revised mistake	Long life learning
8	Used and maintenance the tools	Initiative and enterprise
9	Works evaluation	

As shown on Table 2, the skill demand that demand in the world of work divide in two main skill such as technical skill and employability skill. Technical skills were consist in nine specific skill, where employability skills consist eight specific skill. Technical skills related to the skill that demand on construction industry, while employability skills are not limited to the construction industry but in broader industry.

4. DISCUSSION

Based on the research, mostly graduate occupations are in the construction industry. It means about 65% of the graduates achieve the impact of the learning process at VHE, it also as well as the learning outcome of the VHE of civil engineering department which supposed to graduates could be achieve the occupation at the construction industry. This result according to statement that the competency at the workplace is related to the major in the individual attributes. The attributes are the prior knowledge, skills and attitudes, are drawn on in performing tasks in specific work contexts and which results in overall job performance.

The occupation described above explain the duty at the workplace. It also elaborating the competency which required to achieved the occupation. Based on this research, the institutional of VHE of civil engineering department should organized the curriculum and the material in the learning process to prepare the readiness of the student in facing the need of the competences at the workplace. As¹⁰ describe that curriculum of the civil engineering undergraduate at the Georgia Institute of Technology revised based on the variety input from the user especially the construction industry. It could be done because the competencies of learners are clearly stated in the curriculum.

Little & Colleagues¹¹ argue that technical skills is the capability to perform specific tasks which related to specific competency. The skill demand in the workplace as the result of the research based on analyze of the instrument and structure interview to the graduates and the employ of the graduates. As the research result, the findings in the technical skills that primary changed of the technical skill was the skills from manual skill to digital skill. In other word, we can state that the digital skill should be improve and develop in the learning process at the college to support perform of the graduates in doing specific task at the workplace. Amekudzi et al.¹² suggested that to improve students' competencies and meet the industry demand, the learning was done in project-based learning group. This activity will provide the cultural significance of the research to students and become valuable information for students in understanding the skills that they should be possessed.

Employability skills is a set of achievements, understandings and personal attributes that make individuals more likely to gain employment and be successful in their chosen occupation¹⁵.¹³, while¹⁴ mention that employability skills are an activity which prepares individuals for long-term employment. As the research result, it shown that employability skill of the VHE of civil engineering graduates consist of 8 (eight) skill which related to generic skills. Those skills more

connected to construction industry but also connected to others workplace. To prepare students the competences that demand by industry, Little & Colleagues¹⁵ argue that employability can be enhanced by work-related activities which do not include doing a job of work.¹⁶ proposes future graduates' employability which indicated in generic skills. His conceptual model called Graduate Employability Model (GEM) as a framework for policy makers and higher education practitioners to generate a more stringent quantitative and summative quotient of the employability skills.

In order to prepare the employability skills of the students,¹⁷ recommend an active learning or 'hands on' is the most effective means of developing employability skills given their characteristics. The design of an overall active teaching and learning and assessment strategy for effective employability skill development with adult learning principles: 1) Responsible learning, where learners take responsibility for their learning; 2) Experiential learning, where learners learn from experience; 3) Cooperative learning, where learners learn with and through others; and 4) Reflective learning, where learners reflect on and learn from their experience.

21 CONCLUSION

Based on the findings and discussion, the conclusion of the research: 1) Occupation of VHE of civil engineering department graduate as: field officer, quantity, quality control, administrator, surveyor, and technician. Each occupation elaborated the duty and the competency that graduates must have in order to involve in this occupation; 2) The industry demands technical skill such Understand works subject, Drawing with computer base, Analyze budget, Document management, Applying/Monitoring, Reporting, Revised mistake, Used and maintenance the tools, and Works evaluation; and 3) The employability skills that demand at the industry include the ability in: communication, working in teams, problem solving, self-management, planning and management, information technology and

communication, lifelong learning, and initiative and enterprise.

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