Identifying Competency of Housing Construction Personnel in Indonesia

by Albani Musyafa

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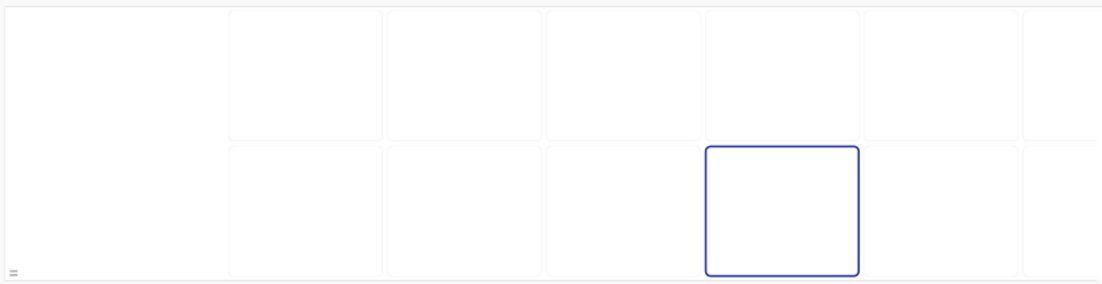

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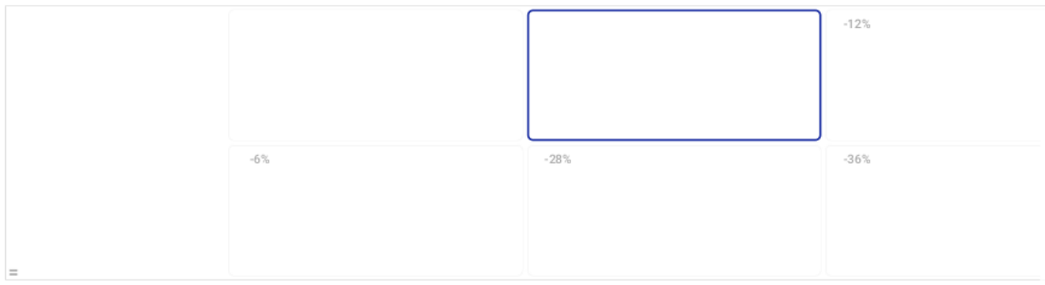

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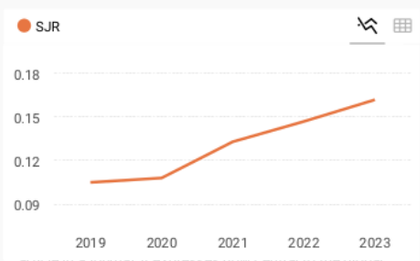
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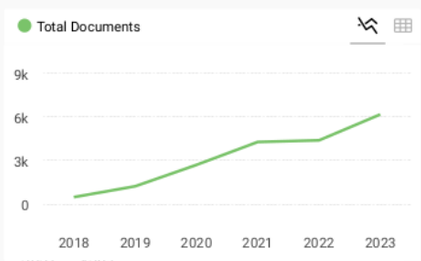
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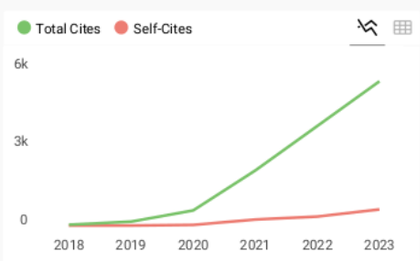
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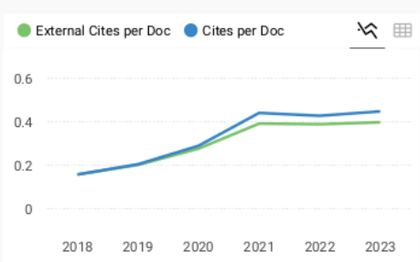
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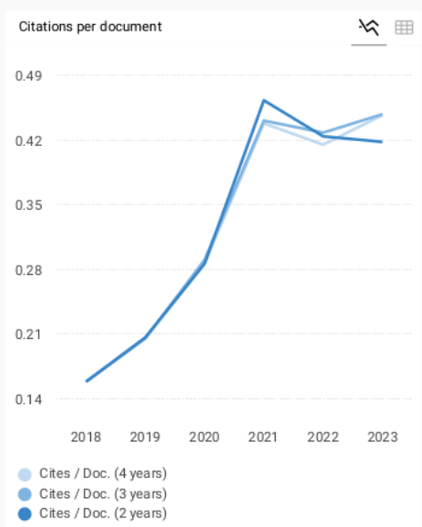
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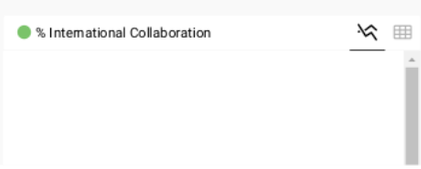
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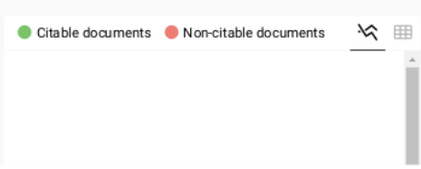
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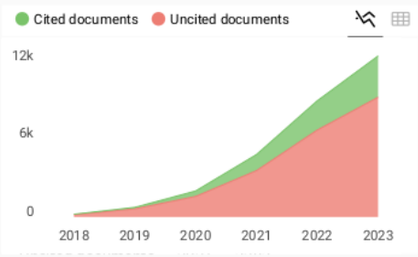

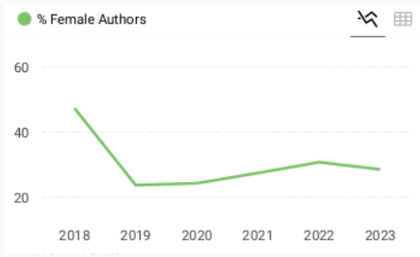

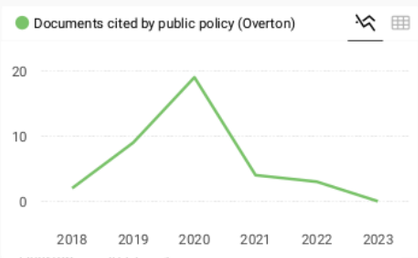

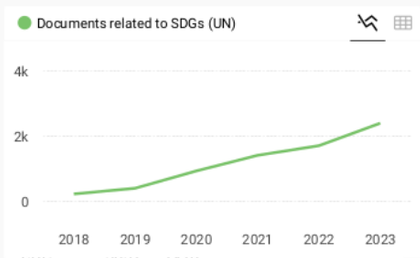

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Editors
Sheila Belayutham
School of Civil Engineering, College of Engineering
Universiti Teknologi MARA
Shah Alam, Selangor, Malaysia

Che Khairil Izam Che Ibrahim
School of Civil Engineering, College of Engineering
Universiti Teknologi MARA
Shah Alam, Selangor, Malaysia

Anizahyati Alisibramulisi
School of Civil Engineering, College of Engineering
Universiti Teknologi MARA
Shah Alam, Selangor, Malaysia

Hazrina Mansor
School of Civil Engineering, College of Engineering
Universiti Teknologi MARA
Shah Alam, Selangor, Malaysia

Muntasir Billah
Department of Civil Engineering
Lakehead University
Thunder Bay, ON, Canada

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Contents

Identifying Competency of Housing Construction Personnel in Indonesia

Albani Musyafa', Dhanoe Seto Nugroho, and Nelly Buldan Afifa Hidayati

Abstract House is one of the main human needs, and the Government must guarantee the fulfilment of these rights. However, at present, Indonesia is experiencing a backlog that is the lack of descents houses for the Indonesian society and this continues to grow as population growth with insufficient housing supply. Increasing the capacity of descent houses production can overcome the backlog in Indonesia so that this problem does not worsen. To increase the capacity of house production, supporting factors must be prepared. These factors include the human resources, especially construction executor who have positions as leaders. The objective of this paper is to determine the critical competencies that must be mastered by the construction executor of house construction. This is useful for improving the education and training for the construction executor. In this study, the method used includes two main steps, first is data collection methods and data processing methods. Data collection was carried out by interviewing and giving questionnaires to those who have knowledge of the construction executor of houses construction work. Data processing is carried out by sorting the mean rank of competencies so that it can be seen the important sequence of competencies that must be owned by the construction executor in the construction of houses. The results of this study get the most important types of competencies for construction executor, namely: competence in reinforcement work, concrete mix work, measurement work, painting work, easel work, and roof covering work.

Keywords Competence · Construction · Descent house

A. Musyafa' · D. S. Nugroho (✉) · N. B. A. Hidayati
Civil Engineering, Universitas Islam Indonesia, Jl. Kaliurang KM 14.5, Sleman, Yogyakarta 55582, Indonesia
e-mail: 17511193@students.uii.ac.id

A. Musyafa'
e-mail: 955110102@uii.ac.id

N. B. A. Hidayati
e-mail: 17511211@students.uii.ac.id

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1 Introduction

Currently Indonesia undergoes a great backlog of decent residential houses. Census 2019 shows that almost seventy percent of the residential house in Indonesia is in the category of houses that are not worth of live from its sanitary aspect [1]

If other aspects are taken into account, the backlog has reached more than 7 million housing units. This number continues to grow along with population growth and the quantity/quality of inadequate supply of houses. As a result of population growth, housing needs reach around 500,000 to 700,000 housing units per year [1, 2]. Meanwhile, housing production from official developers is only around 1 million houses per year [3]. Although housing construction has increased, it is not enough due to less land and increasing population growth. The shortage of housing supply is met by the independent house constructions whose quality is difficult to control.

Often those who have positions or jobs as executors or executors on a project do not pay attention to the ability that must be had to maximize their work. The executor of the project itself is the executor of a construction in general or housing construction project, has an understanding of a person or body that receives or carries out construction work according to the costs provided and carries out in accordance with the rules and conditions and drawings of a predetermined plan, in general called a contractor.

The executor can be in the form of an individual body or company that is a legal entity or a legal entity that is engaged in carrying out construction work. The main task of the executor is the business entity or person appointed by the project owner to carry out the physical work of the project in accordance with the design made by the Planning Consultant in the plan drawing.

In order to become an executor, specific skills are needed to be able to run a project. In general, the capabilities possessed by project executors are the same, but it will be different if the projects carried out are also different. In accordance with the rules that a construction executor must have the ability to work in the field. Therefore, a clear capability standard is needed so that the implementation of housing construction is not constrained in terms of the ability of the housing project executor. Thus, the Indonesian people need to build better quality housing units to overcome the backlog. One of the efforts in meeting the needs of the settlement is housing. One of the efforts to meet the residential need is housing.

In accordance with the government's program to increase the production of liveable houses, human resources (HR) in the housing industry must also be prepared. One of the important human resources is the expert in implementing housing construction. The housing executor must have the competencies needed so that housing has decent quality, however, the price is affordable, and the construction duration is shorter so that the backlog can be overcome in a relatively short time.

However, at present the education institution/training to produce housing construction experts has not worked as expected [4]. Therefore, support for this institution needs to be given. One way is to find out the competencies needed by these experts.

2 Purpose and Objective

The purpose of this paper is to determine the critical competencies that must be mastered by a building construction executor. This is very useful for improving education and training for construction executors in housing construction in Yogyakarta in particular and in Indonesia in general.

This critical competency sequence is used to determine the priority of education and training for the construction executor. The education and training need to be done to print more implementing experts that are needed to overcome the backlog of liveable homes in Indonesia. This education and training are needed to produce more competent human resources especially construction executors to overcome backlog problems in Indonesia.

3 Literature Review

Research on human resource competencies in the field of construction needs to be encouraged. This is because the applicable regulations require that every worker has a certificate of expertise or work skills which include Construction executor or labour qualifications and other classifications [5]. This certification must go through a series of education, training and competency tests including in the field of housing construction.

A decent house is the right of every Indonesian. At present, Indonesian people lack a very large liveable house (backlog) [2]. This backlog will be difficult to overcome without the implementation of good housing construction due to increased demand for housing due to population growth and the quality of home products is still low. Therefore, Indonesia needs a very large workforce in the housing sector, including the experts.

3.1 Experts Executor

Experts. Are individuals who have special expertise in providing services based on their expertise and are not bound by work relations (doing free work/providing professional services), for example accountants, doctors, lawyers, notaries, actuaries, tax consultants, architects, designers and so on.

Executor. Is the person (committee, organization, etc.) working or executing (design and so on).

3.2 Construction Executor

Construction. Construction is an activity to build facilities and infrastructure. In civil engineering, a construction is also known as a building or infrastructure unit in an area or in several areas. In summary construction is defined as the object of the whole building (an) which consists of parts of the structure. For example, Building Structure Construction is the overall shape/shape of the building structure. Other examples: Road Construction, Bridge Construction, Ship Construction, etc.

Construction Executor. Is a classification of workers who work at the construction stage to realize the plans that have been made previously. The main task of the executor in the field of housing construction is to realize buildings that meet the specified quality, time and cost plans. For this reason, executors must develop methods of construction that are appropriate to the conditions, efficient and easy. The implementation can be divided into pre-construction and construction stages [6]. Therefore, the role of the executor is very influential on the quality and cost of implementing residential buildings. This role is increasingly important in large-scale projects such as the current handling of the housing backlog.

3.3 Housing

Housing is a group of houses or other buildings that are built together as a single development. The shape varies in any country. Housing is usually built by a living contractor with only a few styles of house or building design, so that the appearance is uniform.

3.4 Building

Buildings are man-made structures consisting of walls and roofs that are permanently erect somewhere. Buildings are also commonly referred to as houses and buildings, which are all means, infrastructure or infrastructure in culture or human life in building their civilization.

3.5 Residential Building

Judging from its structure, residential buildings can be divided into three main parts namely the foundation, walls and roof. In general, building houses in housing complexes are made of brick, especially on the walls [7]. This structure must be strong enough so that it is not easily damaged/collapsed by common events. The

foundation parts are a structure that supports a building and distributes its load to the earth. The implementation of this section requires building design skills learned in civil engineering.

The wall and roof are generally equipped with facilities for ventilation, natural lighting/artificial and so forth. The interior of the house building is typically divided into several sections, such as a bedroom, kitchen-dining room, bathroom, toilet, laundry and washing place, prayer room, family room, living room, study room, patio, garage and so forth. Meanwhile, the exterior of the building needs to be equipped with a front yard, backyard, garden, carport and others. The houses generally also need utilities such as power cables, communication cables, water pipes, sewage pipes, sewage treatment/trash. However, part of the foundation, walls, roof, interior and exterior home building requires good execution in order to house more secure, convenient, beautiful and can improve the productivity of its occupants. It can be said that a decent residential building has specifications that must meet both its structure, interior, exterior and utilities. The building plan was made by consultant planners. This plan includes pictures, look, cut and detail. Implementing work on the plan. However, in implementation, procedures and methods of implementation should be developed.

3.6 Public Facilities and Social Amenities

Housing requires public facilities and social facilities to support the activities of its citizens. These include public roads, pedestrian street, drainage systems, public lighting, sewerage/water pipes, duct/pipe dirty water, a business centre, health/fitness, parks, games, school buildings, telephone lines, gas pipelines, processing residential waste, security systems, transportation and so forth. The facility should be well planned so that it is safe, orderly, beautiful and easy to maintain. This facility was planned by consultant planners. However, in implementation, procedures and methods of implementation should be developed.

Competency of Executor based on the description, then the housing executor should have the competence to develop creative ideas for the realization of a plan into a real building. An executor housing must be able to translate these plans into operational measures both before construction and during construction [8]. Given the extent of the executor job, these competencies are divided into the pre-construction and construction phase. In the pre-construction stage, the housing executor must be able to develop creative, effective and efficient ideas for the construction and put it in the construction plan. While at the construction stage, the housing executor should be able to realize, correct and improve the initial idea so that the construction process can work well [6].

Based on the study and interview with the interviewees, the competence of the executors in the pre-construction stage are:

1. Budgeting/scheduling

2. Site plan planning for construction
3. Making shop drawings
4. Location mapping
5. Preparation of work contract agreements
6. Anticipating problems occupational Health and Safety
7. Planning of labour

While the executive competence of the construction phase are:

1. Method of implementation of the roof frame
2. The method of implementation of the beam-column reinforcement plate
3. The method of implementation of scaffolding and formwork
4. The method of concreting
5. Electrical work and plumbing jobs
6. Control of materials and equipment
7. Control of time and quality

4 Research Method

The research methods used in this paper includes two main methods, there are data collection and data processing methods. The following is an explanation of the used research methods.

4.1 Data Collection Method

Data was collected by interview and questionnaire. The interview is intended to identify the types of competence while a questionnaire intended to determine the level of importance of these competencies.

Respondents in this study are taken from samples randomly selected from developers who have worked on housing construction in the Yogyakarta region in recent years. This research was conducted by taking the primary data. Thirty samples in this study were people who were leaders of the housing implementation team. They met at the construction site of homes scattered in the Yogyakarta area. Their participation is voluntary.

4.2 Data Processing Method

The main data from this study are tabulated by scoring as Table 1. The score shows the important level in five levels, namely very important, important, doubt, not important, very unimportant. From the table it appears that the data of this study are ordinal or

Table 1 Scoring data

Answer	Score
Very unimportant	1
Not important	2
Doubt	3
important	4
Very important	5

non-parametric [9]. Data processing is intended to rank in order to know the order of importance of competencies that should be owned by the housing executors in carrying out their work. Ranking obtained from the sample data is validated with statistical probability of obtaining a valid generalization [10].

The technique used to obtain the order based on the ranking is the mean rank analysis [10]. Validation test rankings are calculated by using Kendal-W (Kendall's Coefficient of Concordance) which the formula is shown in Eqs. 1 and 2 [10].

$$W = \frac{12\Sigma R_i^2 - 3\pi^2 k(k+1)^2}{\pi^2 k(k-1)^2} \tag{1}$$

$$x^2 = m(k-1)W \tag{2}$$

With:

W Kendall's Coefficient of Concordance
K Census variable
N Census sample
R_i Chi Square

4.3 Description Data

Because there are 14 main questions for 30 respondents, the respondent's answer forms a matrix of 30 × 14. The data are described in Table 2, which shows each question answered by the respondents so that there are no empty variable values. In addition, standard deviation, minimum and maximum values, as well as the average value of each score in variable are also known.

Some of these mean have the same value as happened to competency variables no. 1 and 8 or competency variables no. V3 and V7 and V10 or V8. However, the variables that have the same mean value have a different implementation group. Because ranking is made for each group of stages, this does not matter. Therefore, the order of competence variables can be based on the mean value or mean rank [9]. Appropriate determination of the score, the higher the rank, the more important mean competence. The results of the ranking analysis construction executor competence housing

Table 2 Description data and executor competence

No.	Pre-construction stage competencies	N	Min	Max	Mean	Std. deviation
V1	Budgeting/Scheduling	30	4	5	4.9	0.305
V2	Site plan for construction planning	30	4	5	4.97	0.183
V3	Making shop drawings	30	5	5	5	0.000
V4	Location mapping	30	4	4	4	0.000
V5	Preparation of employment contract agreement	30	3	4	3.53	0.507
V6	Anticipating health and safety issues	30	3	4	3.83	0.379
V7	Workforce planning	30	4	5	4.83	0.379
No.	Construction stage competencies	N	Min	Max	Mean	Std. deviation
V8	Roof truss Implementation methods	30	4	5	4.83	0.379
V9	Beam, column, and plate reinforcing method	30	4	5	4.9	0.305
V10	Scaffolding and formwork implementation methods	30	5	5	5	0.000
V11	Concreting method	30	4	5	4.8	0.407
V12	Electricity and plumbing work	30	4	5	4.47	0.507
V13	Material and equipment control	30	4	5	4.13	0.346
V14	Time and quality control	30	4	5	4.5	0.509

construction executive at pre-construction stage show that sequentially, expert executors of residential buildings have to master the following 7 competencies: Preparation of shop drawings, site plan for construction planning, budgeting, scheduling, workforce planning, locations mapping, anticipation occupational health and safety issues, as well as preparation of contractual agreements. In general, the competencies required in the pre-construction phase have been studied in the course of civil engineering. However, its application in the field of housing still needs to be provided through training especially regarding technical application. Whereas at the construction stage, housing construction executor must master the following 7 competencies: Scaffolding and formwork implementation methods; beam, column, and plate reinforcing method; roof truss implementation methods; concreting method; electricity and plumbing work; time and quality control; as well as material and equipment control.

5 Result and Analysis

Data analysis is intended to obtain a ranking of the types of competencies that are considered important to master by experts in housing construction executives. These competencies are divided into two groups, namely the competence of the pre-construction and construction phase. Based on the competence division, an important level of competence in each stage of the work can be seen in Tables 3 and 4.

According to the score determination, the higher the mean rank value, the more important the competence is. The results of the competency ranking analysis of the experts in the implementation of housing construction at the pre-construction stage show that in sequence, the experts implementing the housing construction must master the following 7 competencies: Making shop drawings, Planning site plans for construction, Budgeting, Scheduling, Workforce planning, Mapping locations, Anticipating occupational health and safety issues, and Preparation of work contract agreements. In general, competencies at the pre-construction stage have been studied in Civil Engineering college, but in terms of implementation, good practice and experience is needed so that application in the housing sector is still needed for training on these competencies, especially regarding technical applications. Whereas in the

Table 3 Important sequence of competencies in pre-construction stage

No.	Pre-construction stage competencies	Mean Rank	Ranking	Description
V1	Budgeting/Scheduling	4.9	3	
V2	Site plan for construction planning	4.97	2	
V3	Making shop drawings	5	1	Most Important
V4	Location mapping	4	5	
V5	Preparation of employment contract agreement	3.53	7	
V6	Anticipating health and safety issues	3.83	6	
V7	Workforce planning	4.83	4	

Table 4 Important Sequence of Competencies in Pre-Construction Stage

No.	Construction stage competencies	Mean rank	Ranking	Description
V8	Roof truss implementation methods	4.83	3	
V9	Beam, column, and plate reinforcing method	4.9	2	
V10	Scaffolding and formwork implementation methods	5	1	Most important
V11	Concreting method	4.8	4	
V12	Electricity and plumbing work	4.47	6	
V13	Material and equipment control	4.13	7	
V14	Time and quality control	4.5	5	

Table 5 Kendall's W test result

Item	Important sequences	
	Pre-construction stage competencies	Construction stage competencies
Number of sample	30	30
Kendall's coefficient of concordance	0.872	0.432
Chi-square	156.898	77.693
Df	6	6
Significance	0.000	0.000
Description	Valid	Valid

construction stage, housing construction experts must master the following 7 competencies: Scaffolding and formwork implementation methods; beam, column, and plate reinforcing method; roof truss implementation methods; concreting method; electricity and plumbing work; time and quality control; as well as material and equipment control. In general, the competencies needed at the construction stage have been studied in the civil engineering study program too. However, competence at the construction implementation stage has also been studied in civil engineering college, but in this case the main milestone is how the ability of the executors to apply the competencies that have been previously learned which greatly determines the performance of the workforce and the results of the work. To determine the effect of the addition of respondents (if done) then the sequence is tested by Kendall's W or the Coefficient of Concordance [9]. The test results can be seen in Table 5.

From the test, it is known that the significance number of the competency sequences is less than 0.05. This means that the competencies sequence in both pre-construction and construction stages are valid [10].

6 Discussion

To overcome the backlog that occurs in Indonesia, it is very dependent on the construction executors and the competencies they have, but many construction executors do not know what competencies are needed and need to be improved. Most assume that management expertise is needed, but not only that expertise is needed there are many more skills needed and need to be improved. For discussion, these competencies are compared with those developed in the study program which are relatively close to the housing sector, namely civil engineering. As shown by Table 3, in the pre-construction stage, there are seven most important competencies that must be possessed by experts implementing housing construction. Of the seven competencies, there are three competencies that should receive more attention for

civil engineering graduates who want to become experts in implementing housing construction, namely making shop drawings, planning site plans for construction, and preparing work contract agreements.

The first competency is the ability of executors to plan and make a good site plan so that the circulation of work does not interfere with each other, with the arranged circulation of work, the work will be more efficient and quickly completed. The second competency is the ability to draw pictures of the housing plan that will be implemented, in accordance with the plan and the description given. The third competency is the ability to make employment contracts agreement. The work contract is used if a field executor gets a job as an executor in the auction model with the housing developer, to avoid fraud that harms the field executor.

Meanwhile, at the construction stage, of the seven competencies that must be mastered, three competencies that need more attention from civil engineering graduates who want to become experts are the scaffolding and formwork implementation method, the roof truss implementation method, as well as the electrical work and pipeline. These competencies are centred on the ability of the executor to properly direct and supervise the work, including in choosing what method to use in carrying out the construction in accordance with the situation and conditions so that the work can run smoothly, safely, and on time.

7 Conclusion

This research resulted in two groups of competencies that must be mastered by experts in the field, namely: pre-construction stage competencies and construction stage competencies.

The important sequence of competencies in the group is as follows. In the pre-construction stage, housing construction experts must master: Preparation of shop drawings, site plan for construction planning, budgeting, scheduling, workforce planning, locations mapping, anticipation occupational health and safety issues, and as well as preparation of contractual agreements. In general, competencies at the pre-construction stage have been studied in Civil Engineering college, but in terms of implementation, good practice and experience is needed so that application in the housing sector is still needed for training on these competencies, especially regarding technical applications.

Whereas in the construction phase, housing construction experts must master: Method of scaffolding and formwork implementation, Method of reinforcing plate column reinforcement, Method of roof truss implementation, Concrete method, Time and quality control, Electrical work and plumbing, Material and equipment control. In general, the competencies needed at the construction stage have been studied in the civil engineering study program too. However, competence at the construction implementation stage has also been studied in civil engineering college, but in this case the main milestone is how the ability of the executors to apply the competencies

that have been previously learned which greatly determines the performance of the workforce and the results of the work.

It is recommended for graduates of educational and training institutions to add and deepen these competencies so that the alumni have the competencies needed to become experts in implementing housing construction which are much needed. Working as a field executor of a housing project is not an easy job, where a career is at stake in the results of the housing construction. The better the results achieved, the greater the opportunity to continue working in the field of building construction, especially housing. When becoming a field executor of a housing development project, it is expected to master the skills needed to work. It is expected that with the high skills acquired as executors can help overcome the existing backlog more efficiently.

8 Research Limitation

Limitations need to be made for this broad scope of research. These limits are:

1. Housing is housing with a land area of more than 1 ha;
2. Respondents in this study are housing developers who have carried out housing construction of an area of more than 1 ha;
3. The house construction under review is to have a reinforced concrete beam-column structure and brick wall
4. Data collection was conducted in 2019 in the Yogyakarta region.

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