

THE ANALYSIS OF COMPARISON OF FLOOR CERAMIC INSTALLATION PRODUCTIVITY BASED ON THE COMPOSITION OF LABOR



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ABSTRACT

Floor ceramic installation is one of work items which its implementation schedule accuracy is largely determined by the productivity of the mason in floor ceramic installation. The productivity of the mason in floor ceramic installation varies, this shows that the use of labor working on floor ceramic installation affects the productivity. This study analyzed the comparison of floor ceramic installation productivity based on the composition of labor that work in floor ceramic installation. The composition of labor that were observed consists of 3 (three) compositions. Of the 3 (three) compositions of labor that were observed, the composition that consists of 2 (two) masons and 2 (two) journeymen generated the highest productivity of 1,73 m².

Received 18 June 2021

Accepted 1 July 2021

Published 7 July 2021

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DOI [10.29121/ijetmr.v8.i7.2021.985](https://doi.org/10.29121/ijetmr.v8.i7.2021.985)

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Keywords: Productivity, Floor Ceramic Installation, Labor Composition

1. INTRODUCTION

A construction project that limited by project time must be well managed so that the project completion time is not exceed the given time requirement. The large number of work items that must be completed in construction project needs the ability to assign the proper quantity of labor that meet the requirement so that there will be no overdue in an item of work. The delay of an item of work will not only causing the delay of other items of work but also will delay the completion of overall construction project.

The relationship between one and another item of work must be carefully calculated so that the project can be implemented in accordance with the given time requirement. One of the factors that affects the completion of an item of work is the productivity of labor that implement the work. The higher the productivity rate the faster the item of work can be completed.

The floor ceramic installation is one of work items which its implementing schedule accuracy is largely determined by the productivity of the mason that implements the work. The productivity of mason in floor ceramic installation varies, this

is proved among others by [Zainuri and Megasari \(2015\)](#) , shows that a number of 5 (Five) masons and 5 (Five) journeymen that install floor ceramic generate different productivity. Then, [Ongkojoyo et al. \(2014\)](#) shows that the average productivity number of floor ceramic installation in Indonesia is 1,44 m²/hour. The variation of productivity shows that the allocation of labor in floor ceramic installation affects the resulting productivity. [Alfianarrochmah and Sigit \(2019\)](#) states that the productivity of floor ceramic installation is 1,143 m²/hour and the wages is IDR9.642, - per m².

As the object of observation in this study, labor productivity is very influential, among others are its quantity and composition. Therefore, this study analyzed the comparison of productivity of floor ceramic installation based on the composition of labor.

2. MATERIALS AND METHODS

According to Bennet Silalahi (1994), labor productivity can be measured by focusing on the number of deployed labor. Thus, productivity is the total output per time unit divided by the total labor per time unit.

According to [Wignjosobroto et al. \(1995\)](#), to put it simple, work productivity can be defined as a comparison (ratio) between its output and input. In this case, if the output is the produced unit and all input are in monetary unit then the productivity is the total produced output (unit) divided by the total spent input (IDR).

While according to [Erviyanto and I. \(2004\)](#) . Productivity is defined as the ratio between output and input, or in other words the ratio between product and total resources used. In a construction project, productivity ratio is the value that measured during construction process. It can be divided into cost of labor, material, and equipment. The success or failure of a construction project depends on the effective use of resources.

There are many factors that affect the productivity. Four main factors that affect the project productivity are grouped by Kaming (1970) in [Erviyanto and I. \(2005\)](#); [Setiawan \(2007\)](#) , they are :

1. **Method and Technology:** Consists of engineering design, construction method, work sequence, and work measurement.
2. **Site Management:** Consists of planning and scheduling, site arrangement, site communication, material management, equipment management, and labor management.
3. **Work Environment:** Consists of work safety, physical environment, quality of supervision, work security, work training, and participation.
4. **Human Factors:** Consists of rate of wages, work satisfaction, incentive, profit sharing, working relationship between foremen and journeymen, working relationship among colleagues, and absenteeism.

While according to [Wignjosoebroto et al. \(1995\)](#) , variables that affect the productivity of field workers can be grouped into :

1. Site physical condition and supporting infrastructure
2. Supervision, planning, and coordination
3. Working group composition
4. Overtime
5. Project size
6. Experience curves
7. Direct worker versus subcontractor and work density

Of the various theories that described before, one of the variables that affects work productivity is labor composition. In this study it is the labor composition of floor ceramic installation.

Floor ceramic installation is performed when the work floor is ready. Ceramic floor tile is a floor finishing that made of ceramic with various type and size. The size of a ceramic floor tile includes 20x20cm, 30x30cm, 40x40cm, 50x50cm, and others. The purpose of installing ceramic tiles is not only to cover but also to strengthen the floor, to make the floor easier to be cleaned and maintained, and to decorate the room (floor). Besides those functions, the effect of ceramic floor tiles can bring some particular atmosphere in the room, depends on its pattern.

Research method that be used was observation method, a research method to measure the individual act and process in an observed occassion. This study performed direct observation towards masons and journeymen that install the floor ceramic.

Technique of data collection that use observation applied if the study is about human behaviour, working process, natural phenomena, and if the number of the observed respondents is not too large. In terms of data collection process, observation can be divided into participant observation and non participant observation.

In participant observation researchers are involved in the daily activities of the subject who are being observed or who are being used as research data source. While doing observation, the researchers participate in the activity of the data source, and therefore share the joy and the sad experiences. With this participant observation, the collected data is more complete, sharp, up to understanding the meaning of every occurred behaviour.

While in non-participant observation, the researchers are not participated and only act as independent observer. In performing observation, the researchers use validated reserach instruments as a guide. Observation of production process, the quality of product, and the performance of the workers is very suitable using this data collection technique. This study used the non-participant observation data collection.

The study was performed by observing the activity of floor ceramic installation in the same location and the tile size that be installed was 50 cm x 50 cm.

This study observed the installation of floor ceramic with various labor composition. The observed labor composition consists of 3 (three) compositions, they are :

1. Composition 1, consists of 1 (one) mason and 1(one) journeyman. The installation activity performed by the mason while the journeyman helped prepare the material and equipment and served the mason’s needs.
2. Composition 2, consists of 2(two) masons and 1(one) journeyman. The installation activity performed by 2(two) masons, the activity started from the center point and the two masons work towards opposite direction. The first mason installed the ceramic to the right side and the second mason to the left side. In this composition, the journeyman served and prepared material and equipment for the two masons.
3. Composition 3, consists of 2(two) masons and 2(two) journeymen. The installation activity performed by 2(two) masons, the activity started from the center point and the two masons work towards opposite direction. The first mason installed the ceramic to the right side and the second mason to the left side. In this composition each journeymen served and prepared material and equipment for one mason.

The observation performed consecutively for 6(six) days towards the same subject based on the composition.

3. RESULTS AND DISCUSSIONS

After performing observation for 6 (six) days consecutively, the productivity of floor ceramic installation based on 3 (three) labor compositions are obtained, they are :

- Composition 1, consists of 1 (one) mason and 1(one) journeyman. In this composition, in carrying out the floor ceramic installation, one mason was helped by one journeyman. The result of the observation can be seen in [Table 1](#) .

Table 1 The result of observation of floor ceramic installation of composition 1			
No	Observation Day	Work Result for 7 work hours	Work result per hour
1	Day 1	9,65	1,38
2	Day 2	11,30	1,61
3	Day 3	10,15	1,45
4	Day 4	10,15	1,45
5	Day 5	10,65	1,52
6	Day 6	10,90	1,56
AVERAGE		10,47	1,50

Based on [Table 1](#) , it can be seen that the results of the ceramic installation work obtained have the lowest productivity occurred in day 1 of 9,65 and the highest productivity occurred in day 2 of 11,3 and for 6 days consecutively the average productivity of 10.47 m²for 7 (seven) work hours or 1,50 m²per hour are obtained.

- Composition 2, consists of 2 (two) masons and 1 (one) journeyman. In this composition, in carrying out the floor ceramic installation, two masons were helped by one journeyman. The results of the observation can be seen in [Table 2](#)

No	Observation Day	Work Result for 7 work hours	Work result per hour
1	Day 1	22,60	1,61
2	Day 2	22,60	1,61
3	Day 3	22,60	1,61
4	Day 4	24,35	1,74
5	Day 5	25,60	1,83
6	Day 6	24,10	1,72
AVERAGE		23,64	1,69

From [Table 2](#) it is obtained that by using 2(two) masons and 1(one) journeyman the lowest productivity of 22,6 occurred in the first, second, and third day. The highest productivity occurred in day 5 of 25,6. And the average productivity of composition 2 (two) of 23,64 m²for 7(seven) work hours or 1,69 per hour per 1(one) mason.

- Composition 3, consists of 2(two masons and 2(two) journeymen. This composition consists of two masons that helped by two journeymen. The results of the observation can be seen in [Table 3](#) .

No	Observation Day	Work Result for 7 work hours	Work result per hour
1	Day 1	24,10	1,72
2	Day 2	24,60	1,76
3	Day 3	24,10	1,72
4	Day 4	23,60	1,69
5	Day 5	24,45	1,75
6	Day 6	24,60	1,76
AVERAGE		24,24	1,73

Based on [Table 3](#) it can be seen that floor ceramic installation that used composition of two masons and two journeymen generates the lowest productivity of 23,6

that occurred in the first and the fourth day. The highest productivity of 24,6 occurred in the second and sixth day. While the average productivity of 24,24 m² for 7 work hours for 2 (two) masons or 1,73 m² per hour per mason are obtained.

The worker's productivity per hour for all labor compositions are tabulated in [Table 4](#)

Table 4 Recapitulation of productivity of each labor composition in floor ceramic installation.		
No	COMPOSITION	Productivity per Hour
1	Composition 1 1(one) mason, 1(one) journeyman	1,50
2	Composition 2 2(two) masons, 1(one) journeyman	1,69
3	Composition 3 2(two) masons, 2(two) journeymen	1,73

Based on [Table 4](#), the productivity of Composition 1 is 1,50 m² per hour, composition 2 is 1,69 m² per hour, and composition 3 is 1,73 m² per hour. Thus, the productivity comparison of composition 1 : composition 2 : composition 3 is 1 : 1,12 ; 1,15. Therefore, it can be stated that labor composition in floor ceramic installation affect the productivity, that an addition of mason or journeyman can increase the productivity.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the above discussion, it can be concluded that of the 3 (three) labor compositions that were observed in floor ceramic installation, the composition that consists of 2(two) masons and 2(two) journeymen generated the highest productivity of 1,73 m². For future study it would better to perform further research about the amount of wages related to the labor composition, further research about the effects of the distance of the material location with the installation location, and further observation on the effects of work hour towards the productivity.

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