PRODUCTIVITY COMPARISON OF LOCAL AND NON LOCAL ON BRICK MASONS, PLASTERING AND COATING WORKS
(Case Study on The Development Project of Residental Home Lampung)

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Presented in accordance with the requirements for the degree of Bachelor S-1 of Civil Engineering Engineering Faculty

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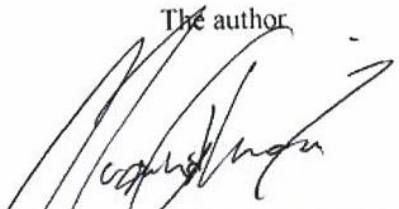

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Abstrak

Sektor konstruksi dituntut untuk memiliki produktivitas kerja yang tinggi untuk menyokong pertumbuhan ekonomi di Indonesia. Produktivitas merupakan hal yang tidak bisa ditawar bagi setiap tenaga kerja dalam penyelesaian suatu pekerjaan Upaya meminimalisasi kurangnya produktifitas pekerja pada suatu proyek konstruksi yang dapat menghambat pekerjaan konstruksi perlu dilakukan oleh suatu perusahaan dengan menekankan pemahaman tentang pentingnya produktivitas mulai dari dalam level manajemen tingkat atas hingga tingkat bawah, yakni kepada buruh atau tukang. Perusahaan yang memiliki tenaga kerja berbeda beda asal daerahnya tentunya akan mempengaruhi produktivitas tenaga kerja. Salah satu contohnya adalah pada proyek pembangunan Perumahan yang berlokasi di Kabupaten Lampung Tengah, Provinsi Lampung. Penelitian ini bertujuan untuk mengetahui produktivitas tenaga kerja lokal dan non lokal serta membandingkan produktivitas tenaga kerja lokal dengan tenaga kerja non lokal pada proyek pembangunan tersebut terhadap pekerjaan pasang bata, plesteran, dan coating. Berdasarkan hasil perhitungan dan analisa data, dapat disimpulkan bahwa nilai produktivitas tenaga non lokal lebih tinggi dibangingkan tenaga kerja local, akan tetapi angka selisih perbedaannya tidak terlalu signifikan.

Kata Kunci: Produktivitas, tenaga kerja, lokal, non lokal, construction

Abstracts

The construction sector is required to have high work productivity to support economic growth in Indonesia. Productivity is non-negotiable for every labor in the completion of a job The effort to minimize the lack of worker productivity on a construction project can hinder the construction work needs to be done by a company by emphasizing an understanding of the importance of productivity ranging from top to bottom level, ie to workers or artisans. Companies that have different labor different regions will certainly affect the productivity of labor. One example is the construction project of Residental Home Building located in Central Lampung District, Lampung Province. This study aims to determine the productivity of local and non-local labor and compare the productivity of local labor with non-local labor in the construction project to the work of red brick, stucco, and coating. After calculation and processing data it can be conclude that he productivity of non local labour is higher than local labor, but the difference value is not quite significance

Keywords: Productivity, labor, local, non local, construction

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1. INTRODUCTION

The construction sector is required to have high work productivity to support economic growth in Indonesia. Productivity is not negotiable for every labor in the completion of a job. According to Laksono (2007), mention that the lack of awareness of the power of the importance of productivity will lead to low work generated, thus affecting the profitability of the company. Efforts

to minimize the lack of worker productivity on a construction project can hamper construction work to be done by a company by emphasizing an understanding of the importance of productivity from the top to bottom management level to the worker or the craftsman. Sudari (2013) mentions that the quantity of factors affecting labor productivity is divided into several things, including implementation management, project resource management and others, while other factors that are difficult to measure include managerial capability, motivation, local culture and weather. Companies that have different labor different regions will certainly affect the productivity of labor. One example is the construction project of Residental HomeBuilding located in Central Lampung District, Lampung Province, Indonesia by CV. Binwirya Group which has workers from different regions. The number of personnel in the company is 30 local workers coming from Lampung and 50 non local workers who are observers from Java. With the labor coming from the local area and the labor coming from the overseas areas, it is necessary to research a comparison of labor productivity from different regions of origin and this is also influenced by different cultural factors.

According to Ervianto (2008), in general productivity is the ratio between the results of activities (output) and input (input). In construction, the notion of productivity is usually associated with worker productivity and can be described as a comparison between work and work hours. According to Yenny et al (2014), productivity is defined as the ratio between output and input, or the ratio between production and total resources used. In the construction project the ratio of productivity is the value measured during the construction process, can be separated into labor costs, materials, and tools. Productivity is also defined as the level of efficiency in producing goods or services. The most famous productivity measure relates to labor that can be calculated by dividing spending by the amount used or working hours of people (Sudari, 2013). It can be concluded that the unit of productivity calculation is essentially the same ie the ratio between output and its input (Jono, 2015). However, the units used to declare the resulting productivity depends on the work calculated productivity (Laksono, 2007). Factors that affect the productivity of an activity or work vary, including two factors that affect the level of labor productivity from the point of human resource management. Both factors are also influenced by the ability to realize and develop a sense of security and job satisfaction in each worker or individually. Mandani (2010) stated that, factors affecting labor productivity are as follows: the quality or amount of labor used in a construction project, the level of labor skills, cultural and educational background, including the influence of factors the environment and the family towards formal education taken by the labor, the ability of the labor to analyze the current situation within the scope of its work and the moral attitude taken under such conditions, high labor interest in the type of work occupied, the structure of work, expertise, and age (sometimes gender) of the labor force.

This study aims to determine the productivity of local and non local labor and compare the productivity of local labor with non local labor on the project of building Residental Home by CV. Binwirya Group on red brick work, plastering, and coating. In general, the expected benefits of this study are as input and consideration for developers and building construction contractors in order to optimize the productivity of labor in project work in order to achieve the target time, quality and cost, as well as a benchmark to overcome the uncertainty that occurred in the field so that it can be seen whether the project is progressing or delays. While in particular is making a real contribution to the Civil Engineering Study Program, Faculty of Engineering, University of Muhammadiyah Surakarta in the field of research. However, in order to avoid expansion in the discussion of this study, the authors provide limitations of the problem on research as follows:

1. The project chosen for the research is the construction project of Residental Home Building located in Central Lampung District, Lampung Province by CV. Binwirya Group.
2. This study only compares the productivity of local and non-local labor in red brick, stucco, and coating work on the project.
3. The labour observed is only expert labour.
4. The local labor in this study is coming from Lampung with the number of samples used as many as 6 people for each job.
5. Non-local labor in this study is derived from Solo Jawa Tengah with the number of samples used as many as 6 people for each job.
6. The method used in this study using the method of time study by comparison of the volume of work / person / time.
7. Productivity is based only on the calculation of the standard time value.
8. Observations made during 7 working days, which is assumed as effective working day.

2. METHOD

2.1. Reseach Location

The location of this research was conducted on the development of Residental Home Building by CV. Binwirya Group located at Adipuro Village, Trimurjo Sub-District, Central Lampung District, Lampung Province, Indonesia.

2.2. Data Source

Data to be used in this research is obtained from primary data and secondary data. Primary data is the data that comes from observations made field. Primary data in the form of observation time or working hours, the number of labor and the amount of work volume on red brick pairs,

plastering, and acian. While secondary data obtained from relevant agencies, in this case BSN (National Standardization Agency) in the form of wage standard of artisan in SNI.

2.3. Research Stages

Stages of observation by time study:

1. Determine the type of work to be observed and understand the conditions of work at the time.
2. Every job is broken down into multiple jobs.
3. Every work breakdown is observed from start to end.
4. Time recorded included in the time study.
5. Convert the worker's wage into a handyman with a standard wage handyman
6. Calculate the basic time value by diverting the converter's wage conversion value by the time recorded
7. Basic time data is then calculated by taking into account the time of contingency and relaxation to obtain standart time

The steps of calculation by means of time study to obtain the value of productivity are as follows:

1. Recording time each time observation of elements of work field and then included in the time study sheet to obtain the basic time value of each observation every work element.
2. The basic time value is the manhour value for the volume of work.
3. The basic time value of each observation of the elements of work then in number and averaged to obtain the average basic time.
4. The average basic time value is then calculated by considering the contingency and relaxation time to obtain the standard value of each work element.
5. After that the total time standard of the work unit is calculated by multiplying the standard time element of the work item by the volume of acquisition for that element of work (volume) of acquisition and the total standard time should be from 1 time observation in a given time.
6. Compare the total volume of job acquisition with the total standard time to obtain the productivity value of a job.

2.4. Research Flow Chart

Research flow chart can be seen in Figure 1.

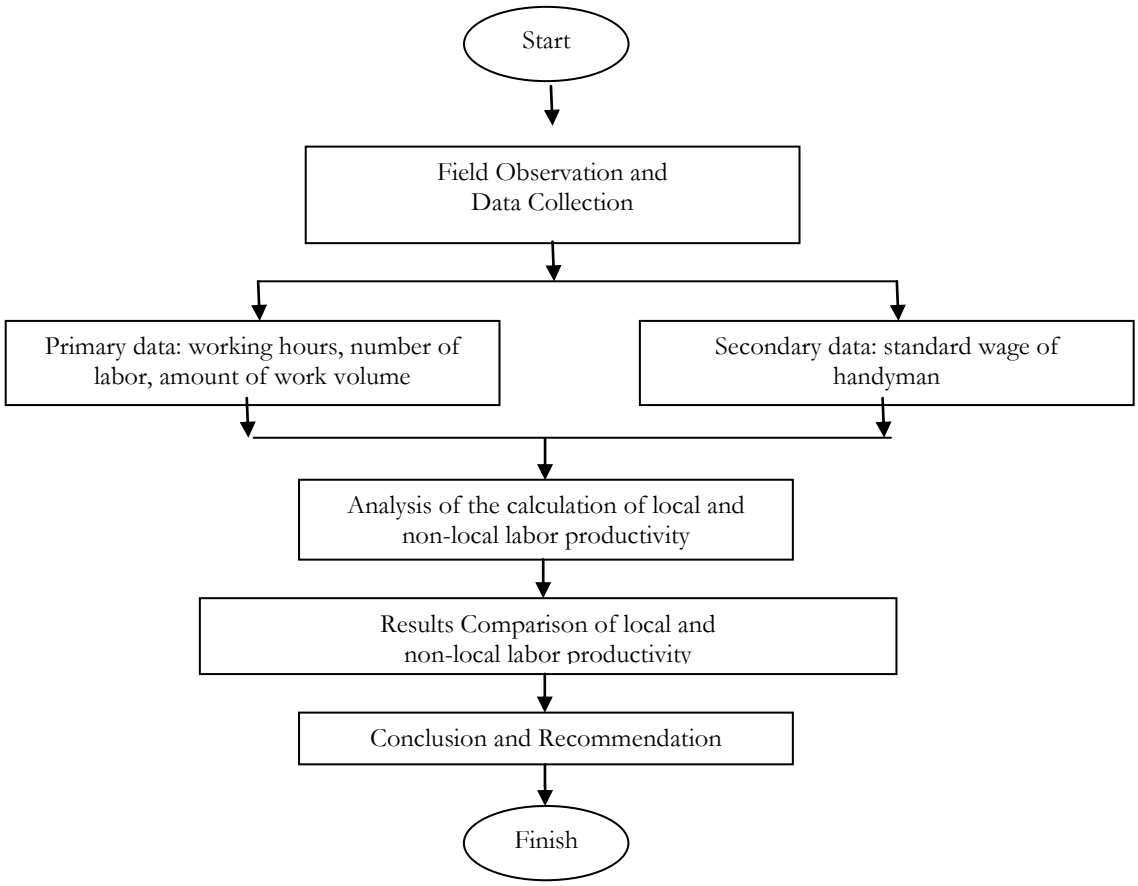

Figure 1. Research flow chart

2.5. Analysis Method

2.5.1. Time Study Method

Time study is a job measurement technique by collecting data based on the time required by completing a job (Pawiro, 2015). In the time study, separation of work elements to be reviewed the performance of the workers reviewed. Time Study Time assessment form is presented in Table 1.

Table 1.Time Study Abstract Sheet (Time Study Rating Form)

Time Study Abstract Sheet																	
Date :																	
Hour Work	Name	Sallary	Convertion	Area	*R*	*WR*	*BT*	*BT/ m^2*	*S*	*P*	*A*	*C*	*E*	*M*	*% Con*	*Total % `*	*S.T.*

Source: Sudari, 2013

Legend :

Working hours = Observation every hour in 7 working hours effective

Name = Name of handler / knock for sample (S)

Wage = Wages set by the foreman for each sample

Conversion = (Wage assigned / Wage standart)

Area = Area obtained in a given time (m^2)

R = Rating (hours)

WR = Watch Reading, observation time (hours)

BT = Basic Time, WR x (R / 100) (hr)

S (Standard) = Personal needs (toilet, drinking, hand washing, etc.) and normal fatigue (%)

P (Position) = Position (%)

A (Attention) = Attention (%)

C (Condition) = General Condition (%)

E (Effort) = Expense / Effort (%)

M (Monotonous) = Boredom (%)

Con = In set contingency score of 5%

S.T = standard time

2.5.2. Rating

Ervianto (2008) suggests in general research conducted based on an assessment that shows the number 100, providing performance information that occurs in normal circumstances. Assessment is an activity comparing the implementation of work performed by workers in the field with standard performance. Assessment can be seen in Table 2.

Table 2. Rating

Rating	**Deskripsi**	Comparison to speed
0	No activities	0
50	Very slow, lazy, workers look sleepy	2
75	Calm, unhurried, looks slow but workers keep working	3
100 (standard)	Fast, Looks professional	4
125	Extremely fast, working with skillful and efficient movements, highly trained workers	5
150	Special speed, requires a lot of energy and concentration is usually not last long highly trained and highly skilled workers	6

Sumber: Heap,1987

A good standard time should be based on estimating (estimating), planning (planning), and control (controlling) work. in general the standard time is based on numbers. The rating range is in the range of 50-125. The number 100 is the benchmark for normal performance. While the number above 100 means that work is done quickly and vice versa, a number below 100 means work is done slowly.

The results of this rating calculation will then be used to determine the amount of basic time with the calculation:

Basic time = (time x conversion) / area (manhour) (1)

For relaxation allowances, based on labor conditions when observations are made. For convenience, it can be seen Table 3, while the standard time can be formulated as follows:

S.T (standard time) = Basic Time +% Relaxation +% Contingency (2)

Table 3. Effect of Relaxation Against Basic Time

Condition / Cause	Deskripsi	Percent of Basic Time
Standart	Personal needs (toilet, drinking, hand washing, etc.) and normal fatigue	8
Working Position	Stand up	2
	Position is quite difficult	2-7
	The position is very difficult (lying down, hands reach maximum, etc.)	2-7
Concentration	Regular attention, look at the pictures	0-5
	Extra attention, elaborate explanations and long	0-8
Environment	Lighting: quite till dim	0-5
	Ventilation: enough until dusty conditions extream / very dusty	0-5
	Noise: quiet until very noisy	0-5
	Hot: cool to 35 degrees centigrade humidity 95%	0-7
Power that Used	Light weight: load up to 5 kg	1
	Medium: load up to 20 kg	1-10
	Weight: load up to 40 kg	10-30
	Very heavy: load up to 50 kg	30-50
Watch / Boredom	Mentally	0-4
	Physically	0-5

Sumber: Heap,1987

In Relaxation allowance there is no allowances index specifically used in the construction industry, so the approach is used percentage of basic time. Contingency is the addition of time at the standard time will be better if done and this cannot be determined precisely, but in reality always happens in the field. A contingency time of 5% is usually sufficient for most construction works (Sudari, 2013 and Pawiro, 2015).

2.6. Research Time

This research was conducted for 21 days (3 weeks) with the time division of research is as follows:

1. The first 7 days (1st week), observed masonry work with the number of workers studied as many as 6 stonemasons.
2. The second 7 days (2nd week), observed plastering work researched with the number of workers studied as many as 6 bricklayers.
3. The third 7 days (3rd week), observed masonry work with the number of workers studied as many as 6 bricklayers.

The documentation of observation can be seen in Figure 1.

(a) (b)

Figure 1. Plastering work (a) and Coating work (b)

3. RESULT

The calculation is started by conversion calculations are done by dividing wages by wage standards included in the worker's wage. This is done to facilitate calculation and conversion. Assumed the default conversion is a conversion for the builder. It is inserted to equalize all elements and standard time can be obtained. The use of artisans as a standard wage conversion is also intended because of the builders is a key element in the productivity of a job while the knock is helpful to the work of the craftsman. This has been discussed also with the foremen there. Basic time gained has been converted with rating. This calculation is then added to the relaxation of the labor. Calculation relaxation is determined on the basis of the circumstances that exist when the

labor performs the job. It is determined by condition, weather, humidity, etc. according to which occurred during the observation. The contingency time is set at 5% with refers to the possibility of weather and disturbances that occur in doing the work finishing. The result of this calculation is the standard time (manhour) that is the time required by the labor in doing 1 m^2 of review work. Once obtained manhour for 1 sample in each day, then made a standard time recapitulation in 1 day. One sample denotes the standard time of one worker, time it takes one labor to make a 1 m^2 work product flat average of 7 effective working hours / day. After obtaining the average productivity of 1 sample in one day, then it is made recapitulation for 7 days of observation to obtain an average for productivity installation of brick masons, platering and coating work.

An example of calculating the work of brick masons can be seen in Table 4 and Table 5 below. Sample of calculation explained below to obtain standart time and productivity of Local Labor:

1. Name : Agus Riyanto
2. Wages :
   Wage assigned = Rp 145.000,00
   Wage standart = Rp 63.000,00
3. Conversion = Rp 145.000,00 / Rp 63.000,00 = 2.30
4. Area = 5.00 m^2 (based on field observation)
5. Rating = 3 hours (based on assumption, see on Table 2)
6. Watch Reading = 7 hours
7. Basic Time = 7 x (3/100) = 0.21
8. Basic Time Convertion = 0,21 / 7 x 2.30 = 0.069
9. S (Standard) = 8 (based on assumption, see on Table 3)
10. P (Position) = 2 (based on assumption, see on Table 3)
11. A (Attention) = 3 (based on assumption, see on Table 3)
12. C (Condition) = 2 (based on assumption, see on Table 3)
13. E (Effort) = 35 (based on assumption, see on Table 3)
14. M (Monotonous) = 2 (based on assumption, see on Table 3)
15. % Cont = 5 %
16. Tot = 8 + 2 + 3 + 2 + 35 + 2 + 5 = 57 %
17. Standard Time = 0.069 + (53 /100) = 0.6390 manhour
18. Total Manhour = 0.639 x 7 = 4.473 manhour
19. Total Productivity = 5.00 / 4.473 = 1.118 m^2/manhour

Table 4. Brick Masons work calculation of Local Labor

Time Study Abstract Sheet																				
Date : Monday, 20 November 2017																				
Local Labor		**Brick masons**																		
1	2	3 a	3 b	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Agus Riyanto	7	145	63	2.30	5.00	3	7	0.21	0.069	8	2	3	2	35	2	5	57	0.6390	4.473	1.118
Riadil	7	130	63	2.06	6.00	2	7	0.14	0.041	8	2	3	2	35	2	5	57	0.6113	4.279	1.402
Riyadi G	7	110	63	1.75	5.00	3	7	0.21	0.052	8	2	5	1	35	3	5	59	0.6424	4.97	1.112
Joko P	7	150	63	2.38	4.50	2	7	0.14	0.048	8	3	1	2	35	2	5	56	0.6076	4.253	1.058
Mohadi	7	130	63	2.06	6.00	3	7	0.21	0.062	8	2	2	2	35	2	5	56	0.6219	4.353	1.378
Achamad	7	90	63	1.43	4.00	2	7	0.14	0.029	8	4	5	2	35	2	5	61	0.6386	4.470	0.895
Average	**7**	**125.8**	**63**	**2.00**	**5.08**	**2**	**7**	**0.5**	**0.050**	**8**	**3**	**3**	**1.8**	**35**	**2.2**	**5**	**57.7**	**0.6268**	**4.388**	**1.161**

Table 5. Brick Masons work calculation of Non Local Labor

Time Study Abstract Sheet																				
Date : Monday, 20 November 2017																				
Non Local Laborers		**Brick masons**																		
1	2	3 a	3 b	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rabino	7	150	63	2.38	6.00	3	7	0.21	0.071	8	2	1	2	35	2	5	21	0.6214	4.350	1.379
Saban	7	128	63	2.03	7.00	4	7	0.28	0.081	8	2	1	2	35	2	5	21	0.6313	4.419	1.589
Yanto	7	112	63	1.78	5.50	3	7	0.21	0.053	8	2	2	1	35	3	5	22	0.6133	4.293	1.281
Paiman	7	150	63	2.38	6.00	2	7	0.14	0.048	8	3	1	2	35	2	5	22	0.6076	4.253	1.411
Sugito	7	130	63	2.06	6.00	4	7	0.28	0.083	8	2	2	2	35	2	5	22	0.6425	4.498	1.334
Slamet	7	90	63	1.43	4.50	2	7	0.14	0.029	8	4	2	2	35	2	5	24	0.6086	4.260	1.056
Average	**7**	**126,7**	**63**	**2.00**	**5.83**	**3**	**7**	**0.21**	**0.061**	**8**	**3**	**3**	**1.8**	**35**	**2.2**	**5**	**22**	**0.6208**	**4.346**	**1.341**

Legend:

1 = Name

2 = Working hours (hours), 7 hours

3 = Wages x Rp 1.000,00, a = Wage assigned, b = Wage standart

4 = Conversion(a/b)

5 = Area (m^2)

6 = Rating (hours)

7 = Watch Reading, observation time (hours)

8 = Basic Time, 7 x (6 / 100) (hours)

9 = Basic Time Convertion (4 x7/8)

10 = S (Standard)

11 = P (Position)

12 = A (Attention)

13 = C (Condition)

14 = E (Effort)

15 = M (Monotonous)

16 = % Cont

17 = Tot % (10+11+12+13+14+15+16)

18 = Standard Time

19 = Total Manhour

20 = Total Productivity (5/19)

Recapitulation of Standart Time (ST) Total Productivity (TP) of local and non local labor during 7 days observatin of each works can be seen in Table 6 to Table 8.

Table 6. Brick Masons work

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Total Average	
Labor	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr	ST manhr	TP m^2/manhr
Local	0.6268	1.161	0.6235	1.184	0.6285	1.175	0.6268	1.140	0.6251	1.162	0.6251	1.164	0.6218	1.248	0.6254	1.176
Non Local	0.6208	1.341	0.6191	1.347	0.6191	1.347	0.6208	1.400	0.8791	0.948	0.6258	1.353	0.6348	1.313	0.6599	1.293

Based on the total average standart time and productivity of brick mason work shown that non local labour is higher than local labor with the difference value is not quite significance. Local

labour satandart time is 0.6254 manhour, while non local productivity is 0.6599 manhour. Local labour productivity is 1.176 m^2/manhour, while non local productivity is 1.293 m^2/manhour.

Table 7. Plastering work

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Total Average	
Labor	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP
	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr
Local	0.5416	2.485	0.5399	2.448	0.5433	2.502	0.5383	2.523	0.5483	2.410	0.5433	2.389	0.5416	2.243	0.5423	2.429
Non Local	0.5361	2.642	0.5394	2.788	0.5361	2.621	0.5344	2.784	0.5378	2.526	0.5394	2.694	0.5444	2.408	0.5383	2.631

According to Table 7 above, the total average standart time and productivity of plastering work shown that non local labour is higher than local labor with the difference value is not quite significance. Local labour satandart time is 0.5423 manhour, while non local productivity is 0.5382 manhour. Local labour productivity is 2.429 m^2/manhour, while non local productivity is 2.444 m^2/manhour.

Table 8. Coating work

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Total Average	
Labor	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP	ST	TP
	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr	manhr	m^2/manhr
Local	0.5518	2.310	0.5501	2.251	0.5535	2.196	0.5485	2.301	0.5585	2.240	0.5535	2.259	0.5518	2.116	0.5525	2.239
Non Local	0.5442	2.495	0.5509	2.419	0.5476	2.508	0.5459	2.554	0.5492	2.382	0.5509	2.418	0.5559	2.334	0.5492	2.444

Based on Table 8, the total average standart time and productivity of coating work shown that non local labour is higher than local labor with the difference value is not quite significance. Local labour satandart time is 0.5525 manhour, while non local productivity is 0.5492 manhour. Labour productivity is 2.239 m^2/manhour, while non local productivity is 2.444 m^2/manhour.

4. CONCLUSION AND RECOMMENDATION

4.1. Conclusion

After calculation and processing data it can be conclude that he productivity of non local labour is higher than local labor, but the difference value is not quite significance. The total average productivity value each work as follows:

1. The total average productivity of brick mason work of local labour productivity is 1.176 m^2/manhour, while non local productivity is 1.293 m^2/manhour.
2. The total average productivity of plastering work of local labour productivity is 2.429 m^2/manhour, non while local productivity is 2.631 m^2/manhour.
3. The total average productivity of coating work of local labour productivity is 2.239 m^2/manhour, non while local productivity is 2.444 m^2/manhour.

4.2. Recommendation

Researchers are aware that there is still a lot lacking in this research and still is can be improved even more. The suggestions for this research include:

1. It needs to be studied how to obtained productivity value using another method, despite of time study.
2. For the next research, it needs to be studied what factorcs makes the different value productivity of local and non local labor. Construction practitioners are advised to review habits, mindsets, characters, and systems the value of labor.

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