



# Contribution of Construction Investment on Gross Value Added, Employment Absorption and Import Content in Indonesia

Ismail Widadi

Ministry of Public Works, Indonesia

Email: [ism.widadi@pu.go.id](mailto:ism.widadi@pu.go.id)

## Abstract

*Investment on construction sector is believed to have a very large contribution to economic growth through employment absorption. On the other hand, many construction projects in Indonesia still depend on imports of construction materials. Previous studies showed the role of investment on other sectors instead of construction sector, which did not relate to imported materials. This research has analyzed the contribution of construction investment as well as to examine the correlation of construction investment on Gross Value Added (GVA), employment absorption (EA), and import content (IC), during 2007-2011.*

*Input-Output (I-O) analysis method based on Leontief procedure is utilized to analyze the 2008 I-O data sourced from the Central Bureau of Statistics. Kossov procedure is utilized to aggregate matrix of 66 sectors matrix into 29 sectors matrix. Utilizing spearman correlation analysis, the result shows a significant correlation between construction investment and each of the three independent variables (GVA, EA, IC), with correlation coefficient respectively 0.863, 0.975, and 0.893. The result also shows a significant contribution of construction investment to these variables respectively 74.5 %, 95.0 %, and 79.7 %. It means, the increasing of construction investment gives high influence to the increasing of GVA, EA and IC. ICOR during the period is 0.29, it means construction investment is quite efficient to produce the construction output.*

**Keywords:** *Construction investment, gross value added, import content, forward and backward linkage, labor absorption, capital output ratio, sustainability.*

## INTRODUCTION

Development is essentially humanizing humans, which the indicator is the fulfillment of basic needs, freedom and dignity (Wan Usman, 2006). To meet basic human needs, construction is required.

One important part of sustainable development activities is an investment (Mankiew, 2003). According to Harrod-Domar (in Jhingan, 2004), the investment is the main key to economic growth, because investment can generate income and increase production capacity by increasing the capital stock.

One reason of the imbalance in development process is the lack of proper investment priorities. The way to eliminate this issue is to understand the different

roles of different sectors within the economic development. For example, the construction sector, which is expected to contribute more in development projects through employment absorption. This is supported by Wibowo research (2009) which states that construction sector in Indonesia contributed immensely not only in employment absorption, but also in improving worker skills. Instead of Wibowo research, there has not been many research on the construction investment sector. Hence it is important to continue the research, further exploring the influence of construction investment, in order to contribute to the acceleration of development in Indonesia.

Several studies on the importance of investment (World Bank, 2010; EIU, 2007; Basri, 2011; Sun, 2001; Zhang, 2005), are mutually reinforcing that the investment plays an important role in increasing economic growth and employment absorption.

Regarding construction investment, the construction sector in Indonesia is supported significantly by state budget. In the box below, it appears the amount of the budget for the construction sector. It is considered logic, since this sector is expected to absorb the labor force and factual contribution to gross domestic product (GDP). Table 1 shows that the field of construction business to contribute an average of 10.3 percent of total gross domestic product (BPS, 2010).

Source: Kompas, 29 September 2011

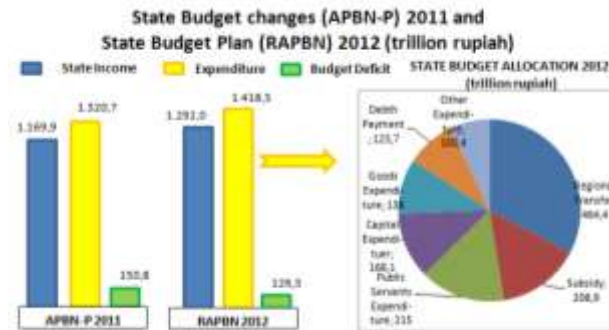


Table 1. Gross Domestic Product at Current Prices (Milyar Rp)

Business Sector	2007	2008	2009	2010
1 Agriculture, Livestock, Forestry and Fisheries	541.931,5	716.656,2	857.241,4	985.143,6
2 Mining and Quarrying	440.609,6	541.334,3	591.912,4	705.491,2
3 Processing Industry	1.068.653,9	1.376.441,7	1.477.674,3	1.577.905,2
4 Electricity, Gas and Water Supply	34.723,8	40.888,6	47.165,9	50.042,2
5 <b>Construction</b>	<b>304.996,8</b>	<b>419.711,9</b>	<b>555.201,4</b>	<b>660.967,5</b>
6 Trade, Hotel and Restaurant	592.304,1	691.487,5	744.122,2	878.108,5
7 Transport and Communication	264.263,3	312.190,2	352.423,4	413.966,0
8 Finance, Real Estate and Business Services	305.213,5	268.129,2	404.013,4	462.788,8
9 Services	398.196,7	481.848,3	574.116,5	654.680,0
Gross Domestic Product	3.950.893,2	4.948.688,4	5.603.871,2	6.389.093,0

Source: BPS 2010



However, the implementation of investment projects for construction still requires imported goods as inputs in order to make the construction products. In associated with foreign exchange owned by the state, when the import content of construction products is quite high, its sustainability will be disturbed. Therefore, there is a need to investigate how the construction sector investments are able to increase the gross value added, how much they can create jobs, how much imported materials exist every year in this sector and how much of the import contents of the construction product.

There are several previous studies (Mauricio et al., 2002; Lucio et al., 2006) which relate to the creation of value-added investments in industry and employment. Relatively new research is done by Bachtiar (2009), which in terms of job creation and added value in the primary sector, Bachtiar said that exports of manufactured products in the primary sector, managed to create significant employment absorption. However, Bachtiar did not discuss the existence of high import content.

### **PROBLEMS AND RESEARCH QUESTIONS**

Research problem is how construction investment contributes to the increase of gross value added, employment absorption, and import content. The following research questions:

In the period 2007-2011, how much the contribution and correlation of construction investment to:

- the increase of gross value added of construction sector?
- the employment absorption in the construction sector?
- the need for import / import content of construction products?

How much backward linkage and forward linkage sector construction and other sectors?

What is the pattern of construction investment in the period 2007-2011?

### **RESEARCH OBJECTIVES**

The purpose of this study is to measure the correlation and the contribution of construction investment to the gross value added, the employment, to the needs of import / import content of construction products in the period 2007-2011, as well as to measure the backward linkage and forward linkage sector construction and other sectors;

In addition to the four-point goal, in this study also known the pattern of construction investment in the period 2007-2011.

## LIMITATIONS

Limitation of this study, as follows:

- This study is an analysis of Indonesia's macro economy are aggregated
- Data construction is a combination of government and private investment.
- Using the input-output (IO) method, with all the assumptions related.
- Limited to construction 5 sectors, derived from the 66 sectors, subject to data published by BPS in 2008.
- It examines the economic aspects of the construction sector investments, it did not examine the technical aspects of the detail of construction management.
- The study did not examine the efficiency of investment and sustainable development indicators in detail.

## Sustainable Development and Economic Development

According to the Brundtland report (UN, 2001),

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their Own needs."

Sustainable development include: economic development, social advance and environmental protection (Adams, 2006 and Cato, 2009).



Figure 2.1 Illustration of the Pillars of Sustainable Development

(Source: Adams, 2006)

## Economic Development and the Role of Construction Sector

Several previous studies demonstrated the importance of the construction sector to economic development. Yudhoyono (2004) showed an increase in government spending on **infrastructure (construction sector) have a positive impact to development through economic growth and employment absorption.**



## **Economic Growth**

Economic growth is the primary measure of development success in which economic growth results can also be enjoyed by the whole community, either by themselves or by government intervention (Sirojuzilam, 2008). Lots of theories of economic growth, one of which states the role of endogenous growth in investment in physical capital and human capital contribute to determine the long-term economic growth. In other words, **investment is needed to promote sustainable economic growth** (Mankiw, 2003).

## **Investment**

According to Boediono (1997), investment is spending the manufacturer for the purchase of goods and services to increase the stock of which is used or for plant expansion. Some theories of investment, among others, by Keynes, Harrod-Domar, Solow-Swan.

Mosk (2004) states that **investment in infrastructure is the force behind** Japan's economic growth. China is not much different, with infrastructure investment averaged 15% GDP, in 30 years (1978-2008) GDP per-capita income increased 15 times from U.S. \$ 220 to U.S. \$ 3400. (Sahoo, et al., 2010).

## **Gross Value Added (GVA)**

**GVA serve as a benchmark of productivity of investment** (Kalangi, 2006). Performance of a production process to produce output, can be seen from the GVA produced during a certain period. GVA is the difference between the output and cost between. The cost of the goods and services that are not durable used in the production process. Form of value-added includes the components of factor income (wages / salaries, interest of capital, land rents and profits or surplus venture), depreciation of capital goods, and net indirect taxes.

According to Mankiw (2003), the indicators used to measure regional economic growth is the growth rate of Gross Regional Domestic Product (GRDP), the number of GVA generated by all sectors of the economy in the region.

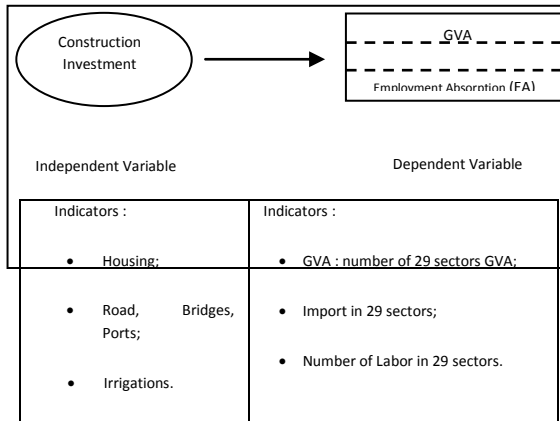
## **Labor**

One positive factor of growth in the economic is population and labor force growth (Todaro, 2000). Labor is the working age population (15-64 years) or the entire population in a country that can produce goods and services if there is demand for them, and if they want to participate in these activities (Subri, 2003). In effect, **one of the goals of economic development is the provision of sufficient jobs for the workforce, or how much labor can be absorbed.**

## Import Content

To improve a production, it is important to know **how much import content used to generate the output**. The import content is the use of imported materials in the production process (Dornbusch, et al., 2004). In Keynes's theory, the import is one of the national revenue leakage, if there are no imported components, then national income will be higher (Dornbusch, et al., 2004).

### Conceptual Framework and Variable Identification



## Theory of Input - Output (I-O) by Leontief

Syafrizal (2008) argues the economic linkages between sectors is an important element in the process of economic development in the area. These linkages can be either forward (forward linkage), and backward (backward linkage). One analysis that can examine the interrelated of the economy structure is an Input-Output (IO) analysis, which was introduced by Vassily W. Leontief (Tarin, 2005). IO analysis provides detailed and concise picture of the total output of each sector and the needs of production and resources, and predicts the impact of changes in one sector to another sector (Nazara, 2005).

### The research hypothesis

For the three identified dependent variables, the hypothesis is arranged. Null hypothesis is there is no significant correlation between the construction sector with the three dependent variables at the construction sector (2007-2011). While the alternative hypothesis is there is a significant correlation between investment in the construction sector the three dependent variables at the construction sector (2007-2011).

The results of the above hypothesis testing are followed by calculation of the contribution of construction investment to each variable.

## Methodology

This study used data of 2008 IO tables published by BPS (2008) which contains a matrix of 66 x 66 sectors. The analytical method used is Input-Output analysis methods introduced by Leontief. The 66 x 66 matrix was aggregated into 29 x 29 matrix following the method of aggregation (Fisher, 1969; Neudecker, 1970; Kossov, 1972; Andergerg, 1973; Kymn and Norsworthy, 1976; Blin and Cohen, 1977), and then to test the first, the second and the third hypothesis the Pearson correlation test was used to determine the correlation between investment in the construction sector 5 with 3 variables (GVA, LF, IC) in the period 2007-2011.

Yr	INV	GVA	Yr	INV	EA	Yr	INV	IC
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{\{n \sum x^2 - (\sum x)^2\} \{n \sum y^2 - (\sum y)^2\}}}$$

$$\sqrt{\{n \sum x^2 - (\sum x)^2\} \{n \sum y^2 - (\sum y)^2\}}$$

The contribution is the coefficient of determination, which is  $r^2$ .

## RESULTS AND FINDINGS

IO Table 2008 by transformation of 66 sectors into 29 sectors

Results of aggregation process 66 sectors into 29 sectors, is presented in the following table:

**Table 2. Classification IO Table 66 sectors into 29 sectors**

code 29	code 66	SECTOR
1	1	Paddy
2	2-4	Crops
3	5	Vegetables and fruits
4	6	Other food crops
5	7-17	Plantation
6	18-20	Livestock
7	21-22	Forestry
8	23	Fishery
9	24	Coal and metal mining
10	25	Extraction of oil, gas and geothermal
11	26	Other mining and quarrying
12	27-34	Manufacture of food, beverages and tobacco
13	35-36	Spinning industry, textiles, clothing and leather
14	37	Manufacture of bamboo, wood and rattan
15	38	Paper industry, the threads of the paper and paperboard
16	39-42	Industrial fertilizers, pesticides, chemicals, plastics and oil refinery
17	43-44	Non-metal goods industry
18	45-47	Metal industry
19	48-49	Industrial machinery, tools and repairs



20	50	Other industries
21	51	Electricity, gas and water supply
22	52	Residential and non residential buildings
23	52	Agricultural infrastructure
24	52	Roads, bridges and ports
25	52	Buildings and installations of electricity, gas and water supply, and communication
26	52	Other buildings
27	53-54	Trade, hotel and restaurant
28	55-60	Transport and communications
29	61-66	Services

## ANALYSIS TO ANSWER THE RESEARCH OBJECTIVES

**Table 3. The IO analysis results, Construction and Investment relation to GVA (In Million rupiahs)**

Code and Sector	2007	2008	2009	2010	2011
22. Residential and non residential buildings	191.453.213	239.670.906	271.562.736	310.726.331	351,757,597
23. Agricultural infrastructure	50.075.792	62.687.433	71.028.942	81.272.426	92.004.412
24. Roads, bridges and ports	125.363.989	156.937.041	177.819.882	203.464.291	230.331.655
25. Buildings and installations of electricity, gas and water supply, and communication	15.712.621	19.669.867	22.287.234	25.501.401	28.868.849
26. Other buildings	13.142.762	16.452.780	18.642.071	21.330.549	24.147.238
Total	395.748.377	495.418.022	561.340.864	642.294.999	727.109.750

The analysis shows that investment in the construction sector within the period 2007-2011 provide a considerable influence on the formation of output and GVA, in which 49.6% was seen in five sectors of construction. In Table 3, sector 22 gives higher added value than other sectors. This can be explained that the construction of homes will cause effects on the production of construction materials such as coal, sand, nails, cement and so on. In the year of 2009-2010 there are also construction investment (ie sector 22 and 24) remained giving high impact to the GVA, the decline in construction investment during those years is not particularly affect the GVA. It shows the construction sector is quite productive, although in general the productivity of the sector declined in those years as the world economic crisis, especially in Europe and US.

The results of calculations show the investment in the construction sector within the period of 2007-2011 gave effect to an increase of GVA in five sectors (22, 23, 24, 25, 26), amounting to more than 300 trillion rupiah. This is consistent with the studies and reports of financial newsletter (2010) both published by the BPS (2011) and by the Ministry of Finance and Bank Indonesia (2010) that in the period 2007-2001, the five sectors of the construction sector are the largest contributor to economic growth. The results also showed an increase in investment by one percent gives an increase of 0.91% GVA, in other words it is close to elastic.

The analysis showed that investment in the construction sector within the period of 2007-2011 provide a considerable influence on the employment absorption, of which 37% occurred in the five sectors of construction. The table shows sector 22 and sector 24 absorb larger workforce than other construction sectors. Sector 22 absorbs half of total employment in the construction sector. Weakening of economic growth in Indonesia during 2009, as the impact of economic crisis in the United States, was also influential in the declining of construction investment and employment absorption this year. Nevertheless, the construction sector showed a quick recovery in employment in 2010 and subsequent years. This is understandable because of population growth also continued to increase, followed by an increase in the number of residential buildings, construction of roads, ports, and bridges, which is the basic infrastructure needs related to daily human activities. The fulfillment of these needs requires a lot of construction workers.

**Table 4. Results of IO Analysis, Relation of Construction Investment and Labor Absorption (People)**

Code and Sector	2007	2008	2009	2010	2011
22. Residential and non residential buildings	2.207.936	2.348.229	2.289.335	2.402.290	2.777.972
23. Agricultural infrastructure	529.839	563.506	549.373	576.479	666.631
24. Roads, bridges and ports	1.306.002	1.388.986	1.354.150	1.420.963	1.643.180
25. Buildings and installations of electricity, gas and water supply, and communication	223.562	237.768	231.804	243.242	281.281
26. Other buildings	182.485	194.080	189.213	198.549	229.599
Total	4.449.825	4.732.569	4.613.875	4.841.522	5.598.663

From Table 4, it appears the increase of investment each year in the construction sector, followed by an increase in employment. In the period 2007 - 2011, an increase in investment of 1 % followed by an increase of employment absorption by 0.66 %, which in that time have absorbed a total of more than 1.2 million construction workers. It is important for Indonesia that is experiencing high unemployment rates.

The analysis showed that investment in the construction sector in the period 2007-2011 also gave considerable influence to the needs of imports in sector 29, which is 48.6% of imports (import content) to produce the five construction sectors.

From Table 5, it is seen that 22 sectors have a lot imports. From this table, it seems that import content of the construction sector continued to increase every year

except 2009, due to declining economic growth. It is seen that in the year 2009 import requirement decreased significantly. This can be understood as the impact of Indonesia's economy is affected by the condition of the global economic downturn during the end of 2008 until 2009, where all sectors decreased. From the table, it appears that following the improving of macroeconomic, import construction in 2010 and then again stretched up, as a result of all industrial activity is relatively better than the state of the previous year. The results here show that the increase in investment by one percent in that period were able to increase the import content of nearly 1.05%, in other words it is quite elastic. Thus, investment in construction sector quite highly affects the need for imports (import content), which in the period 2007-2011 import content reached 604.7 trillion rupiah, or 23% of the total investment in this period. For example, in year 2008 investment in the construction sector is Rp. 361,104,969.00 followed by import content in the construction sector by Rp. 128,794,267.00 or approximately 30% of the construction investment. When compared to the state budget, import content for the construction sector in 2007-2011 is approximately 10-13 percent of total state budget expenditure.

**Table 5. The results of IO analysis, relation of Import Content and Construction Investment (million USD)**

Code and Sector	2007	2008	2009	2010	2011
22. Residential and non residential buildings	38.577.952	66.768.165	50.213.245	70.305.579	87.630.103
23. Agricultural infrastructure	4.864.196	8.418.629	6.331.261	8.864.653	11.049.058
24. Roads, bridges and ports	24.062.833	41.646.358	31.320.297	43.852.805	54.658.902
25. Buildings and installations of electricity, gas and water supply, and communication	4.851.910	8.397.364	6.315.269	8.842.261	11.021.149
26. Other buildings	2.059.098	3.563.751	2.680.132	3.752.561	4.677.257
Total	74.415.989	128.794.267	96.860.204	135.617.859	169.036.469

In the daily activities, it is easy to understand that the construction of residential houses and buildings, require imported material. So do construction of roads, bridges and ports.

Compared to budget of 2007-2011 period, the import needs of the construction sector average is 11.8% of the budget. Thus, considering the draft budget in 2012 reached 1438 trillion rupiahs, import demand in the construction sector can be estimated at approximately 170 trillion rupiahs.

The calculation results of backward linkage and forward linkage are shown in Table 6.



**Table 6. Backward and Forward Linkage Linkage, 29 Sectors**

Sector	Backward	Forward
1 Paddy	0,8097	0,8290
2 Crops	0,7837	0,7205
3 Vegetables and fruits	0,7142	0,6944
4 Other food crops	0,7585	0,6158
5 Plantation	0,9186	1,0086
6 Livestock	1,1621	0,9844
7 Forestry	0,8166	0,8189
8 Fishery	0,8491	0,7673
9 Coal and metal mining	0,8325	1,1387
10 Extraction of oil, gas and geothermal	0,6817	1,2094
11 Other mining and quarrying	0,8317	0,8696
12 Manufacture of food, beverages and tobacco	1,2122	1,1449
13 Spinning industry, textiles, clothing and leather	1,1728	0,8752
14 Manufacture of bamboo, wood and rattan	1,1460	0,9911
15 Paper industry, the threads of the paper and paperboard	1,1507	0,8932
16 Industrial fertilizers, pesticides, chemicals, plastics and oil refinery	0,9375	2,4228
17 Non-metal goods industry	1,0463	0,8255
18 Metal industry	1,0111	1,2320
19 Industrial machinery, tools and repairs	1,0336	1,1773
20 Other industries	1,1281	0,6377
21 Electricity, gas and water supply	1,1532	0,8903
22 Residential and non residential buildings	1,1445	0,7316
23 Agricultural infrastructure	1,1577	0,6391
24 Roads, bridges and ports	1,1070	0,6831
25 Buildings and installations of electricity, gas and water supply, and communication	1,1552	0,6222
26 Other buildings	1,2248	0,6202
27 Trade, hotel and restaurant	1,0827	1,8518
28 Transport and communications	1,0093	1,3142
29 Services	0,9690	1,7912

From the table, it appears that the sector that has a number of backward linkage and forward linkage greater than one are sector 18 (metal industry), sector 19 (industrial machinery, tools and repairs, sector 27 (trade, hotels and restaurants) as well as sector 28 (transport and communication). Based on the theory of development planning (Timbergen, 2000), these sectors are called key sectors. The construction sector (22, 23, 24, 25, 26) are not considered as key sectors, but it has backward linkage greater than one. It means investment in this sector could spread to other sectors that provide inputs to the construction sector, in other words it has a high spread power. It is important for policy development, government needs to be sharper in making priorities.

#### **Analysis of Incremental Capital Output Ratio (ICOR)**

For the year of 2007-2011,

$$\text{the ICOR} = \frac{\Delta INV_{2007-2010}}{\Delta OUTPUT_{2008-2011}}$$

From the calculation results, ICOR = 0.2915, or rounded down to 0.29. It means, to generate an additional output of 1 million rupiahs in the period of 2007-2011, it is required a total investment of 290 thousand rupiahs. Thus, investment in construction sector is very efficient.

### TEST ON HYPOTHESIS

Based on analysis and discussion, the hypothesis was tested as follows:

**Table 7. Variable to test Hypothesis INV-GVA**

INV (Million Rp)	GVA (Million Rp)
242.138.187,50	395.748.377
361.104.969,00	495.418.022
349.994.120,77	561.340.864
348.240.126,67	642.294.999
579.631.510,22	727.109.750

From the statistical analysis, it is obtained  $\alpha = 0.60$  (although more than 0.050 but still less than 0.250), so the hypothesis  $H_0$  is rejected, which means the alternative hypothesis is accepted to receive the existing of correlation between construction investment with gross value added. By the Spearman formula it is obtained  $r = 0.863$ , which means there is a strong correlation. The contribution is equal to the coefficient of determination  $r^2$ , which is equal to 74.5%. The strong correlation between investment in GVA, means supporting the theory of Wagner (Wagner, 1983 in Mankiw, 2003) which states that the higher the investment, the higher the gross value added is obtained. Terms of elasticity of 0.91 (in-elastic), indicating that 1% increase in construction investment followed by gross value added increased by 0.91%.

**Table 8. Variable to test Hypothesis INV-EA**

INV (Million Rp)	EA(people)
242.138.187,50	4.449.825
361.104.969,00	4.732.569
349.994.120,77	4.613.875
348.240.126,67	4.841.522
579.631.510,22	5.598.663

From the statistical analysis, it is obtained  $\alpha = 0.005$  (less than 0.050), so the hypothesis  $H_0$  is rejected, which means the alternative hypothesis is accepted to receive the existing of correlation between the construction investment and in workforce absorption. By the Spearman formula it is obtained  $r = 0.975$ , which means there is a strong correlation. The contribution is equal to the coefficient of

determination  $r^2$ , which is equal to 95%. Robust contribution of construction investment on employment absorption is encouraging, it is related to the fact that Indonesia still has a lot of unemployed labor. In terms of elasticity, it is 0.66 (inelastic), indicating that 1% increase in construction investment affects the increase in the number of workers absorbed by 0.66%.

**Table 9. Variable to test Hypothesis INV-IC**

INV (Million Rp)	IC (Million Rp)
242.138.187,50	74.415.989
361.104.969,00	128.794.267
349.994.120,77	96.860.204
348.240.126,67	135.617.859
579.631.510,22	169.036.469

From the statistical analysis, it is obtained  $\alpha = 0.041$  (less than 0.050), so the hypothesis  $H_0$  is rejected, which means the alternative hypothesis is accepted to receive the existing correlation between construction investment and import content. By the Spearman formula it is obtained  $r = 0.893$ , which means there exists a strong correlation. The contribution is equal to the coefficient of determination  $r^2$ , which is equal to 79.7%. The strong correlation can be understood by the facts that some raw material for construction is still much to be imported from other countries. The elasticity of 1.05, indicating an elastic, where the 1% increase in construction investment followed by an increase of import content by 1.05%.

The fourth hypothesis suggested that the analysis of investment patterns from year to year of construction leads to different value-added sectors 22, 23, 24, 25, 26 rejected. Accepted alternative hypothesis  $H_a$ , the pattern of the five sectors added value is not significantly different. In other words, from year to year during the years 2007 - 2011 same pattern of construction investment, which is always high on residential buildings and not a place to live, then roads, infrastructure and agriculture, is quite logical considering the population of Indonesia is steadily increasing and certainly requires residential and agricultural infrastructures.

## CONCLUSIONS

The results show during the period 2007-2011 that:

Construction investment has a strong correlation with gross value added (GVA) where  $r = 0.863$ . Contribution to the GVA is 74.5%. These findings support the Wagner Law (Mankiw, 2003), the greater the investment, the greater the added value gained. GVA increase the elasticity of 0.91. This means that every 1% increase in construction investment, improve the GVA in the construction sector by 0.91%.



Construction investment has a strong correlation with construction employment absorption ( $r = 0.975$ ). Contribution to construction employment absorption (EA) is 95%. This strengthens some previous studies on the role of investment on the EA. Employment elasticity of 0.66. This means that every 1% increase in construction investment to increase construction employment by 0.66%. This is quite promising, considering that in 2011 the number of workers in Indonesia is still 93% of the total labor force that reached 120 million, of which 5% are construction workers (BPS, 2010). Here there are opportunities, construction investment will increase the employment of the labor force that is unemployed.

Construction investment has a strong correlation with the import content (IC) for the construction products ( $r = 0.893$ ). Contribution of construction investment is 79.7% against IC. This shows the dependence on imports of construction material is still quite large. Amalia (2006) estimated that the construction sector has a major contribution in the import needs of industry sectors ranging from 28-30 percent between the years 1993-2002. The elasticity is 1.05, which means that every 1% increase in investment will be followed by the improve of IC by 1.05 percent. This shows the influence of the construction investment to the IC is quite large, so it is not profitable for the efforts to save foreign exchange. Therefore, in future, the construction of investment policy to be followed by policies that control the use of imported construction materials.

Among five construction sectors studied, all of them have forward linkage value of less than one, which means the sensitivity to the downstream sectors is not strong enough. All sectors have backward linkage greater than one, meaning that they have more spread power to the back sector, for example into sectors which are the inputs of construction products.

During the years 2007 - 2011, the same pattern of construction investment, which means that as long as the proportion of investment in sectors 22, 23, 24, 25, 26 are relatively similar.

Incremental Capital Output Ratio (ICOR) construction investment was 0.29 in 2007-2011. This means that 29 additional capital in the period resulted in 100 additional output, this indicates a very efficient construction investment. This figure can be used as a reference in determining the planning of macro investment needs in the future.

Regarding sustainability, there is still quite a lot of construction materials in Indonesia, which is the more optimal it is utilized, the less dependence on imports of construction materials. Import content is related to foreign exchange reserves, the higher import demand, further reducing reserves. Indonesia's foreign exchange reserves now improved and has reached 112 billion U.S. dollars (BI, 2012), meaning



that Indonesia's export activity is better than import activities. Therefore, the construction sector in the future will continue growing if in line with efforts to secure foreign exchange. Several alternative sources of raw materials of construction materials should be explored. Also the use of materials that can be produced in the country for residential construction, the form of wood, steel and others.

### **CONTRIBUTION OF RESEARCH FINDINGS**

The results of this study contribute to the science of economic development planning, that developing countries should give priority to the sectors that absorb labor. This study proves that investing in the construction sector in addition to increasing the gross value added, is also able to absorb labor in significant numbers.

Findings in this study also support the theory of Timbergen development planning, the construction should be started by the sectors that have a capital output ratio relatively small. The construction sector in Indonesia is very efficient, in the period 2007-2011 it has a small ICOR, which is equal to 0.29. This suggests that the productivity of investment in the construction sector is very high.

Nevertheless, the results of this study also shows that the construction sector in Indonesia still has a high dependency to imported material. Import elasticity of 1.05 is a warning to policy makers in the construction sector to encourage the production and utilization of domestic construction material. If it is not promptly controlled, it is not only an investment fund, even the country's foreign exchange reserves would be exhausted to finance the construction sector imports.

The construction sector has a high dispersive power to the rear which requires the construction material industry, such as the steel industry. This is an opportunity for the development of industries that supply the needs of construction activity, which in turn will reduce the need for imports.

### **SUGGESTIONS / RECOMMENDATIONS**

Further research should investigate the efficiency of investment in other sectors. Another aspect that can be researched by using the IO data are the components of gross value added.

Future studies will be interesting if they examine sustainability in construction, using more comprehensive a data of raw material stocks, such as iron and steel, linking with operational management and construction.



## REFERENCES

- Adams, W.M. (2006), *The Future of Sustainability: Re-thinking Environment and Development in the Twenty-first Century. Report of the IUCN Renowned Thinkers Meeting, 29–31 January 2006.*
- Amalia, L. (2006), Peranan Agroindustri dalam pemulihan perekonomian Indonesia pasca krisis ekonomi. *Jurnal Inovisi Vol.5 (1)*, April 2006.
- Andergerg, M.R. (1973), *Cluster Analysis for Applications*. Academic Press, London.
- Bachtiar, F. (2009), *Ekspor produk manufaktur sektor primer menciptakan tenaga kerja di Indonesia*. Disertasi Doktor. Universitas Trisakti, Jakarta.
- Basri, F. (2011), Menjinakkan Asing. *Dalam koran harian Kompas (2011/05/30)*.
- BI (Bank Indonesia). (2012), *Laporan Neraca Pembayaran Indonesia 2012*. BI. Jakarta-Indonesia
- Boediono. (1997), *Teori Pertumbuhan Ekonomi*. Badan Penerbit Fakultas Ekonomi (BPFE). Universitas Gadjah MadaYogyakarta.
- Blin, J.M. dan C. Cohen. (1977), Technological Similarity and Aggregation in Input-Output Systems: A Cluster–Analytic Approach. *The Review of Economics and Statistics 59* : 82–91.
- BPS (Badan Pusat Statistik). (2011), *Statistik Indonesia tahun 2011*. BPS. Jakarta-Indonesia
- \_\_\_\_\_. (2010), *Indikator Kesejahteraan Rakyat 2009*. BPS. Jakarta-Indonesia
- \_\_\_\_\_. (2008), *Table Input-Output Indonesia Updating 2008*. BPS. Jakarta-Indonesia.
- Cato, M.S. (2009), Green Economics, an introduction to theory, policy and practice. *Journal of Economic Geography 10(3)*: 478-480.
- Dornbusch, R., S. Fisher, dan R. Startz. (2004), *Makro Ekonomi. Edisi Bahasa Indonesia*. PT. Media Global Edukasi. Jakarta.
- EIU (Economist Intelligence Unit). (2007), *World investment prospect to 2011 : Foreign Direct Investment and the challenge of political risk. EIU Report*. (ed). Kekic, L (EIU) dan Sauvant, K.P. (Columbia Program on International Investment).
- Fisher, W.D. (1969), *Clustering and Aggregation in Economics*. Johns Hopkins Press.



- Jhingan, M.L. (2004), *Ekonomi Pembangunan dan Perencanaan*. Cetakan ke sepuluh. PT. Raja Grafindo Persada.
- Kalangi, L.S. (2006), *Dampak Investasi Di Sektor Pertanian dan Agroindustri Dalam Penyerapan Tenaga Kerja dan Distribusi Pendapatan*. Tesis. Sekolah pascasarjana Institut Pertanian Bogor.
- Kompas. (2011), *Badan Anggaran Mulai Bahas RAPBN 2012*. [Online] pada HYPERLINK: <http://www.kompas.co.id> [Akses pada 29 September 2011].
- Kossov, V. (1972), *The Theory of Aggregation in Input–Output Models*. in Carter, A.P. and A. Brody (eds.): *Contributions to Input–Output Analysis*. North–Holland Publishing.
- Kymn, K.O. and J.R. Norsworthy. (1976), A Review of Industry Aggregation in Input–Output Models. *The American Economist*, Spring, 5–10.
- Leontief, W. (1986), *Input-Output Economics*. 2nd ed. New York and Oxford: Oxford University Press.
- Lucio, C., O. Marcelo, dan S. Daniel. (2006), The impact of trade with China and India on Argentina's manufacturing employment. *MPRA Paper No. 538*. October 2006.
- Mankiw, N.G. (2003), *Teori Makroekonomi*. Edisi Kelima. Erlangga. Jakarta.
- Mosk, C. (2004), Japan, Industrialization and Economic Growth. *EH.Net Encyclopedia*, edited by Robert Whaples. January 18, 2004.
- Nazara, S. (2005), *Analisis Input-Output*. Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia. Jakarta
- Neudecker, H. (1970), *Aggregation in Input–Output Analysis: An Extension of Fisher's Method*. *Econometrica*, 38, 921–926.
- Sahoo, P., R.K. Dash, dan G. Nataraj. (2010), Infrastructure Development and Economic Growth in China. *Institute of Developing Economies (IDE) Discussion Paper No. 261*. October 2010.
- Sirojuzilam. (2008), *Disparitas Ekonomi dan Perencanaan Regional, Ketimpangan Ekonomi Wilayah Barat dan Wilayah Timur Provinsi Sumatera Utara*, Pustaka bangsa Press.
- Subri, M. (2003), *Ekonomi Source Daya Manusia*. PT. Raja Grafindo Persada. Jakarta.
- Sun, H. (2001), Foreign Direct Investment and regional export performance in China. *Journal of Regional Science* 41 (2) : 317-336.



- Syafrizal. (2008), *Ekonomi Regional: Teori dan Aplikasi*. Baduose Media. Jakarta.
- Todaro, M.P. (2000), *Ekonomi untuk negara berkembang*. Edisi Ketiga. PT. Bumi Aksara. Jakarta.
- Wan Usman. (2006), *Daya Tahan Bangsa*, Pascasarjana UI.
- Wibowo, A. (2009), The Contribution of the Construction Industry to the Economy of Indonesia : A Systemic Approach. *Working Paper. Construction Management, Civil Engineering*, Department Diponegoro University, Indonesia
- World Bank. (2010), *Annual Report 2010*. Washington DC. Office of the Publisher, External Affairs.
- Yudhoyono, S.B. (2004), *Pembangunan Pertanian dan Perdesaan sebagai upaya Mengatasi Kemiskinan dan Pengangguran: Analisis Ekonomi Politik Kebijakan Fiskal*. Disertasi Doktor. Intitut Pertanian Bogor.
- Zhang, K.H. (2005), How does FDI affect a host country's export performance? The case of China. *Makalah pada International Conference of WTO, China, and the Asian Economies*, III, Xi'an. China. 25-26 Juni 2005.