

THE CONSTRUCTION SECTOR OF INDONESIA*

Akhmad Suraji¹, Krishna S Pribadi², and Ismono³

¹Research Specialist on Construction & Infrastructure Management, University of Andalas Indonesia

²Member of Managing Board, National Construction Services Development Board, Indonesia

³Director of Center for Construction Business and Institutional Development, Ministry of Public Works Indonesia

akhmadsuraji@yahoo.co.uk

1. EXECUTIVE SUMMARY

Economic growth of Indonesia has increased from 6.10% in 2010 to 6.5% in 2011. It is expected this year (2012) is about 6.3% - 6.7% and up to 7.4% (2016) (Central Bank of Indonesia, 2012). The construction growth slightly decreases from 7.0% (2010) to 6.4% (2011), but it is expected to grow between 8.2% – 8.6% in this year. The contribution of construction sector to GDP is 756.5 Trillion IDR (2011) and 410.1 Trillion IDR (Sem-I 2012) based on current price and 160.1 Trillion IDR (2011) and 82.8 Trillion IDR (Sem-I 2012) under constant price (2000). CBS (2012) also published that the contribution of construction sector to GDP is 9.9% (2009), 10.3% (2010), 10.2% (2011) and 10.2% (Sem-I 2012). The growth of GDP of construction sector is 7.2% from Sem-I 2011 to Sem-I 2012. In the next following years until 2014, the volume of construction market will increase dramatically. Under the new masterplan of economic development (2011 – 2025), the Government estimates almost 2,000 Trillion IDR of infrastructure investment to boost economic growth under the new six economic corridors across archipelago (MP3EI, 2011). The market covers various infrastructures both under government funds and state owned companies as well public private partnership financing schemes. For the fiscal year 2012, the government spending for infrastructure provision accounts for almost 200 Trillion IDR and the next coming year accounts for 380 Trillion IDR (2013) in which public work projects covering road networks, water resources and human settlement will get the public funding almost 86 Trillion IDR (2012).

2. MACRO ECONOMY REVIEW & OUTLOOK

2.1 Overview of National Economy

The Indonesian economy is growing significantly since it was hit by Asia economic crisis in 1997 and global financial crisis in 2008. Now it is considered to be in stable state and to growth at 6.06% (2008) but it slightly decreases at 4.5% (2009) and then increases 6.10% (2010) then 6.5% (2011). During the last five years, economic of Indonesia were increased by 5.5% (2006), 6.3% (2007), 6.0% percent (2008), 4.5% (2009), 6.10% (2010) and 6.5% (2011). This year, it is expected to grow 6.3% – 6.7%. Furthermore, the value of GDP at current prices in 2011 Q-III was IDR 1,921.6 trillion and increased in the year 2012 Q-III to become IDR 2,050.1 trillion. In the third quarter of 2011, GDP at constant prices was IDR 632.4 trillion and in the fourth quarter of 2011 was IDR 624.0 trillion. The growth of GDP without oil and gas in the period of quarter I (2012) was IDR 632.8 trillion and in the quarter II was IDR 650.6 trillion (CBS, 2012). Other component of GDP which has significant contribution to GDP is Gross Fixed Capital Formation (GFCF) and export of goods and services. The growth of GFCF is expected 9.6% - 10.1% in 2012. The growth of GFCF in the period of quarter II (2012) over quarter II (2011) was 12.3%. The growth of export of goods and services is 10.9% of 2012 Q-II over 2011 Q-II (CBS, 2012) and decreased as compared to 17.4% in the period of quarter II (2011) over quarter II (2010) (CBS, 2011).

*This paper is updated from the country paper presented in the 17th Asia Construct, 2011

The business trend index of economic sectors shows a better condition. In second quarter of 2011 was 105.75 while in the fourth quarter was 106.92. Meanwhile in the first quarter 2012 was 103.89 and in the second semester was 104.22. It shows that business condition in general is slightly stable. This business condition is growing better since increased revenue due to increasing production capacity and number of working time. Higher business revenue occurs in the finance sector, property and services. The higher increased workforce occurs in the construction sector. The highest business index is 111.51 occurring in the construction sector in 2011 but it decreases to 104.83 in 2012 Q-II. It shows that this sector is the among decreasing sectors in 2012 compared to 2011. However, the agriculture sector has increased its index from 98.14 in 2011 Q-IV to 111.31 in the first quarter 2012 but decreasing to 106.15 in the second quarter 2012. Overall, the business trend index during first quarter of 2012 was 103.89 and then grow up to 104.22 in the second quarter. In the first semester 2012, business condition in the construction sector increased from 98.53 (2012 Q-I) to 104.83 (2012 Q-II).

2.2 Main Economic Indicators

The Indonesian economy is in a stable shape towards increased growth. The Indonesian gross domestic product for 2004 in constant 2000 real prices was RP. 1511 Trillion which represents a 1.03% increase on the previous year. To January 2005 the gross domestic product grew at an annual rate of 5.13% in Central Bureau of Statistics data (CBS, Economic Indicators, January 2005). During the same period the consumer price index standing at 118.53 in January 2005 grew by only 1.43 points against 0.57 the previous year (2002=100). The interest on 90-day bank deposit bills was 6.65% in October and the 10-year Treasury Bonds returned 8.31%. Rising cost of materials including that for crude oil leading to an increase in inflation from 5.06% in 2003 to 6.4% in 2004 and the cyclical Rupiah devaluation of 20% against the US\$ has forced the government to instigate minimization of energy consumption, spending and subsidy provisions nationwide. The unemployment rate however, increased from 15% in 2003 to 16% in 2004. Despite current uncertainties about the international economy and the downturn in balance of payments from US\$28.6 Billion in 2003 to 23.5 Billion in 2004, the rate of economic growth is forecasted to continue to the end of 2010 at 6 % while construction growth is expected to achieve 7 – 8% in 2011, with the domestic economy proving to be relatively resistant to adverse global economic conditions. The inflation rate was higher in 2008 (11.06%), then decreased 2.78% in 2009 and 6.96% in 2010. This year, the inflation rate is forecasted about 4.42%. Table 1 and Table 2 show that main economic indicators. As shown in Table 2, the construction sector growth is very better since the Asia economic crisis. The growth is expected to increase since the government launched of the new masterplan of economic development 2011 – 2025 in which infrastructure development becoming a key strategic role of the national economic development (MP3EI, 2011). Under this new masterplan, there are six economic corridors across the nation with its very specific target of development.

Table 1. Main Economic Indicators

Indicators	2007	2008	2009	2010	2011	2012 (fc)
Economic Growth (%)	6.28	6.06	4.5	6	6.5	6.3 – 6.7
Construction Growth (%)	10.40	10.50	7.95	7.3	7.4	8 – 9
Inflation (%)	6.59	11.06	2.78	6.96	3.8	4.5 – 5.5
Foreign Exchange (Rp/US\$)	9.300	10.895	9.353	8.946	9.010	9.400

Source: Central Bank of Indonesia, Finance Ministry of RI, www.oilprice.net (2009) Updated (2012)

Table 2. Macro Economic Development Indicators

INDICATORS	(1,000,000 IDR)					
	2007	2008	2009	2010	2011	2012 (fc)
GDP at constan prices 2000 Rp. Billion	1,963,092	2,082,104	2,165,388	2,286,650	2,412,076	2,050,100
GDP at current market price	3,949,321	4,954,029	5,152,190	5,440,713	6,165,836	7,020,000
GDP growth (%)	6.28	6.06	4.00	5.6	6.50	6.4
GDP growth (%) for agriculture, forestry and fishery sector	3.43	4.77	3.57	2.9	3.4	3.9
GDP growth (%) for manufacturing sector	4.67	3.66	4.38	3.6	5.0	6.3
GDP growth (%) for services sector	6.60	6.45	6.09	4.6	7.0	7.7
GDP growth (%) for mining sector	2.02	0.51	1.86	3.5	4.6	5.0
GDP growth (%) for construction sector	8.61	7.31	7.95	7.3	5.3	5.6
GDP growth (%) Financial, Ownership and Business Services	7.99	8.24	7.10	5,5	7.3	8.0
GDP growth (%)Transportation and Communication	14.04	16.69	14.43	11.9	13.8	15.1
GDP growth (%)Trade, Hotel and Restaurant	8.41	7.23	7.59	9.3	7.9	9.2
GDP growth (%)Electricity, Gas and Water Supply	10.33	10.92	8.33	7.2	4.2	4.2
Population (number)	225,642	227,779	230,633	237,556	241,417	244,775
Population growth rate (%)	1.30	0.95	1.25	2.9	1.62	1.39
Labour force (number)	109,940	111,879	113,852	116,000	109,67	112,80
Labour force growth rate (%)	3.34	1.76	1.76	1,9	(5,4)	2,8
Unemployment rate	10,547,917	9,427,590	9,258,964	8,595,600	7,700,220	7,610,000
Unemployment growth rate (%)	(5.01)	(10.62)	(1.79)	(7.16)	(10.42)	(1.17)
Inflation rate	6.40	10.31	6.02	5.67	5.38	4.23
Short term interest rate (%)	16.13	16.62	17.12	17.56	17.58	18.00
Long term interest rate (%)	13.00	13.90	14.87	15.18	15.27	16.00
Changes in Consumer Price Index (2007=100)	155.58	170.18	186.16	118.37	114.59	131.92
Average change against USD\$	9,300	10,895	10,150	8,950	9,200	9,500

Source: CBS (2009, 2010, 2011, 2012) & Central Bank of Indonesia (2009, 2010, 2011, 2012)

3. OVERVIEW OF THE CONSTRUCTION INDUSTRY

3.1 Construction Investment

The construction value completed can be seen in Tabel 3. The Government of Indonesia has expressed her desire to speed up infrastructure development in order to accelerate economic growth to levels of 7.8% through increasing the ratio of Investment to GDP to 28.4% from 19.6%, opening new job opportunities to reduce unemployment and poverty alleviation to 5.1% and 8.2%. The above investment driven development plan can be seen in Table 4 which depicts infrastructure demand between 2005-2009 to be Rp.145 Trillion or US\$15.825 Billion. A more accurate picture can be obtained in Table 5 which illustrates for construction investment and maintenance demand in the Department of Public Works to total Rp.73.59 Trillion; broken into Bina Marga (Roads and Bridges) Rp.21.27 Trillion, Sumber Day Air (Water Resources) Rp.34.53 Trillion, Cipta Karya (Human Settlements) Rp.14.60 Trillion, and Other Public Works Rp.3.18 Trillion.

Table 3. Value of Construction Completed by Type of Construction
2006 – 2011 Based on Contract Price (CBS, 2011)

(1,000,000 IDR)

TYPE OF CONSTRUCTION		2006	2007	2008	2009	2010	2011*
1	Residential	9,305,172	9,305,172	11,263,484	12,448,707	13,758,648	15,206,431
2	Non residential	22,069,558	23,528,407	29,613,637	34,421,939	40,010,954	46,507,445
3	Electrical installation	3,363,393	3,563,451	3,775,409	3,999,974	4,237,897	4,489,972
4	Gas and Water supply installation	371,544	319,911	275,453	237,173	204,214	175,834
5	Sanitary installation	194,926	184,447	296,659	477,137	767,413	1,234,285
6	Foundation	850,095	625,198	1,127,658	2,033,936	3,668,572	6,616,935
7	Sound system, AC, lift, etc	1,268,817	1,476,285	1,261,856	1,273,379	1,285,008	1,296,742
8	Water supply network	512,374	538,055	681,455	789,341.97	914,309.44	1,059,061.58
9	Oil and Gas pipe network	648,546	646,127	1,031,995	1,338,225	1,735,324	2,250,257
10	Electricity network	1,027,867	2,406,148	3,653,882	7,051,032	13,606,640	26,257,240
11	Road and bridge works	19,897,065	21,008,143	25,345,791	28,670,093	32,430,404	36,683,909
12	Irrigation/drainage	4,553,470	5,392,472	6,999,582	8,687,475	10,782,390	13,382,477
13	Electric power supply and Telecommunication Network	1,137,230	458,105	218,031	103,770	49,388	23,506
14	Construction or improvement of airport, harbor, bus station, etc	1,598,572	1,513,014	1,112,716	1,053,162	996,795	943,445
15	Other construction works	5,144,678	6,180,386	7,827,060	9,402,775	11,295,708	13,569,719
	TOTAL	71,943,309	79,391,287	94,484,668	111,988,121	135,743,665	169,697,259

Source: CBS (2009)

Table 4. Source of fund for construction projects 2012 (Natsir, 2012)

No	Source of Fund	Procured in 2012 (Million Rp)	Progress in 2012
1	NATIONAL BUDGET FOR PW	71,667,107	55,653,800
2	NATIONAL BUDGET FOR NON PW	57,266,604	31,605,713
3	LOCAL BUDGET	10,862,957**	11,917,551**
4	STATE OWNED CO	107,641,153	93,971,416
5	LOCAL GOV COMPANIES	104,391**	358,958**
6	DOMESTIC INVESTMENT	59,29,458	21,978,306
7	FOREIGN INVESTMENT	35,432,656	8,491,582
8	JOINT INVESTMENT	145,822,700	25,940,013
	TOTAL	488,092,026	249,917,339

Source: PusbinSDI (2012)

** Under Updating

Table 5. Construction Investment Plan under PPP Projects (PPP Books, 2011)

SUMMARY OF PUBLIC PRIVATE PARTNERSHIPS INFRASTRUCTURE PROJECTS PLAN IN INDONESIA			
I. READY FOR OFFER PROJECTS			
No	Sector/Sub-sector	Quantity	Project Cost (US\$ Million)
1	Air Transportation	1	213.61
2	Land Transportation	0	-
3	Marine Transportation	2	1,198.50
4	Railways	0	-
5	Toll Road	2	25,670.40
6	Water Resources	0	-
7	Water Supply	6	311.47
8	Solid Waste and Sanitation	2	130.00
9	Telecommunication	0	-
10	Power	0	-
11	Oil and Gas	0	-
Total		13	27,523.98
II. PRIORITY PROJECTS			
No	Sector/Sub-sector	Quantity	Project Cost (US\$ Million)
1	Air Transportation	0	-
2	Land Transportation	0	-
3	Marine Transportation	0	-
4	Railways	0	-
5	Toll Road	17	8,221.20
6	Water Resources	0	-
7	Water Supply	0	-
8	Solid Waste and Sanitation	2	120.00
9	Telecommunication	0	-
10	Power	2	2,040.20
11	Oil and Gas	0	-
Total		21	10,381.40
III. POTENTIAL PROJECTS			
No	Sector/Sub-sector	Quantity	Project Cost (US\$ Million)
1	Air Transportation	7	1,972.80
2	Land Transportation	2	274.00
3	Marine Transportation	4	2,860.22
4	Railways	3	4,385.30
5	Toll Road	3	1,810.50
6	Water Resources	0	-
7	Water Supply	18	1,363.83
8	Solid Waste and Sanitation	4	50.27
9	Telecommunication	0	-
10	Power	4	2,785.80
11	Oil and Gas	0	-
Total		45	15,502.72
TOTAL INVESTMENT		79	53,408.10

Source: PPP Books (2011)

Public works investment is one of key government plan to deliver roads, water resources and human settlement infrastructures. Tabel 5 shows public works investment plan for the period of 2010 – 2014. The road construction projects have higher priority funding, then water resources project such as irrigations, dams and river engineering projects. However, the human settlement projects covering sewerages, waste treatments and water supply are also among the prioritised public work projects.

Table 6. Public works investment plan (2010 – 2014) (IDR Trillion)

No	Public Works	YEAR					Total
		2010	2011	2012	2013	2014	
1.	Water Resource	11.468	14.908	19.320	25.125	32.679	103.500
2.	Roads	20.102	24.360	30.033	37.061	45.344	156.900
3.	Human Settlements	9.081	11.033	13.413	15.964	19.509	69.000

Source: Center for Strategic Studies, the Ministry of Public Works (2010)

3.2 Construction Companies

According to Law No. 18/1999, construction company consists of consulting and contracting company. Consulting company can be designer and also supervision engineer. Most of construction companies are small medium enterprises.

Table 7. The Number of Construction Companies including Consulting Companies

NO	QUALIFICATION	CONSULTING COMPANIES		CONTRACTING COMPANIES	
		NUMBER	%	NUMBER	%
1	LARGE	449	7	1,742	1
2	MEDIUM	264	4	21,032	12
3	SMALL	5,892	89	160,026	87
	TOTAL	6,605	100	182,800	100

Source: NCSDB (2012)

The number of foreign construction companies has been increasing since a couple of years ago. In the year (2011), the number of foreign contracting companies registered in Indonesia is 128 firms mostly coming from Japan and the number of consulting companies registered in Indonesia is 78 companies, and the number of EPC contractors is 23 companies. The consulting companies are mostly also coming from Japan dan China as well as Korea. The number of contractors from China now increases up to 39 firms. While 5 contractors of India also already expanded their business in Indonesia. In this year, the number of foreign construction companies increased.

Table 8. The Number of Foreign Construction Companies

Year	2007	2008	2009	2010	2011	2012
ASEAN	10	14	14	14	16	16
NON-ASEAN	108	181	184	193	237	239
Total	118	195	198	207	253	255

Source: PusbinUK (2012)

Table 9. The Origin of Construction Companies in Indonesia

Tahun	2005	2006	2007	2008	2009	2010	2011	2012
Japan	32	80	55	77	75	74	80	80
China	0	9	25	30	32	32	39	39
Korea	5	11	11	19	26	33	57	60
India	2	2	1	0	0	1	5	5

Source: PusbinUK (2012)

3.3 Construction Employees and Workforce

Total number of registered engineers is about 106,283 professional engineers (2008). The following table 6 shows the distribution of certificate held by professional engineers according to their expertise.

Table 10. The Number of Professional Engineer

ENGINEER	QUALIFICATION				TOTAL
	APPRENTICE	JUNIOR	SENIOR	MASTER	
Electrical Engineer	165	5,225	3,869	433	9,692
Landscaping Designer	327	4,423	1,099	213	6,062
Civil Engineer	4,841	58,368	18,182	1,917	83,308
Mechanical Engineer	62	2,282	710	74	3,128
Other	37	253	438	71	799
Architecture	265	1,268	1,497	264	3,294
Total	5,697	71,819	25,795	2,972	106,283

Source: NCSDB (2008).

The number of workforce working in the construction sector is more than 5 million people in average. The following table 7 shows annual number of construction workers.

Table 11. The number of construction workforce

Year	2007	2008	2009	2010	2011	2012
Construction Labour	5,252,581	5,547,324	5,858,606	5,590,000	6,340,000	6,100,000

Source: CBS (2012)

3.4 Construction Cost

Indonesia is a large country with high diversity. It is very difficult to get a standard figure of construction cost across archipelago. In Jakarta, skill worker may have 100,000 rupiahs daily wage while in other regions such as Yogyakarta only 40,000 rupiahs. It is similar to natural material price such as sand and stone. In Central Java where sand and cobble stone are easier to get, the cost of sand is roughly 70,000 up to 90,000 rupiahs for 1 m³. It is quite common to buy a truck of sand which is about 2.5 – 3.5 m³ will cost about 300,000 up to 350,000 rupiahs.

REFERENCES

1. Central Berau of Statistic (2011), Economic Indicators, Jakarta
2. Central Berau of Statistic (2010), Economic Indicators, Jakarta
3. Central Bank of Indonesia (2009), Annual Report of National Economy, Jakarta
4. Central Bank of Indonesia (2010), Annual Report of National Economy, Jakarta
5. Central Berau of Statistic (2007), Economic Indicators 2007, Jakarta, Indonesia, June, 2007
6. Mulyo, SS & Abidin, IS (2007), Construction Market in Indonesia, Japan - Indonesia Seminar II, Department of Public Works, Republic of Indonesia, Jakarta.
7. Public Works Department (2008), Program and Target Development, Jakarta
8. Suraji, A (2007), The Indonesian Construction 2030, National Construction Services Development Board, Jakarta
9. Wuryanti, W (2005) Cost Index Component of Reinforce Concrete & Composite for Building Construction (in Indonesian), Seminar, Institute for Research & Development, Ministry of Public Work, Jakarta.

GREEN CONSTRUCTION IN INDONESIA: DEVELOPMENTS, ISSUES, AND CHALLENGES

Muhamad Abduh¹, Reini D. Wirahadikusumah¹, and Dewi Chomistriana²

ABSTRACT: As an effort to implement the sustainable construction concept in Indonesia, the government, particularly the Ministry of Public Works, adopted what so called a defensive strategy and took a leadership role among other stakeholders. The drafted agenda in sustainable construction that was issued by the government suggested other stakeholders to use the document as a reference in discussions to develop more detailed implementable agendas, and to develop strategic actions by all stakeholders as their contributions to the implementation of sustainable construction. More follow-up actions should be executed by the government and especially by the Ministry of Public Works in order to fortify coordination between government agencies, to lift up leadership role credibility, and to promote the champions in the area of sustainable construction. Whilst construction practitioners have developed green movements, such as green building and green contractor, the realization of the proper sustainable construction is still doubtful to be seen. The importance of operations or processes during construction in delivering the green or sustainable value of a construction product, such as building or other infrastructure, is not grasped adequately by stakeholders and still substantially missing in the available assessment systems for green building as well as for assessing the green contractor. Actions to take green movements in Indonesia into their proper tracks that would become effective incentives for achieving sustainable construction in Indonesia are still considered necessary, especially in the area of green construction.

KEYWORDS: construction operation, construction process, green building, green contractor, green construction, sustainable construction.

1. INTRODUCTION

The construction industry is one of the priority sectors to contribute in sustainable development because of the characteristics of the construction process which make the industry the point of departure for necessary changes. Construction industry produces the built environment and most of the infrastructure facilities have very long useful lives. Meanwhile, the construction process and the related activities consume the most natural resources and generate significant wastes. In Indonesia, construction sector contributes about 6% of the GDP and around 5% of national labors depend on this sector. Construction practices with better planning can contribute to the national energy savings. The energy need of the construction sector is estimated to continue to equal the growth of Indonesia's economy, which is in the region of 6%. As Indonesia's electricity is mostly generated by fuels, the global rising price/demand of fuel has made energy into a commodity that is increasingly expensive. Similarly, the construction process has a significant task in the perspectives of increasing water efficiency and minimizing waste. Thus, there is a real need to make changes in construction practices by implementing what so called sustainable construction.

¹ Associate Professors, Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung

² Head of Sustainable Construction Division, Center for Construction Delivery Development, Construction Development Agency, Ministry of Public Works

A formal initiative to implement the sustainable construction in Indonesia has been started by benchmarking activity, which was conducted by the Ministry of Public Works in 2009, to some developed and developing countries. The benchmarking activity was intended to compare baseline conditions, progress of development, and achievements of each country in implementing sustainable construction, and then to formulate the challenges for Indonesians. All of the benchmarked countries were to embark on successful implementation of the sustainability issues in construction industry as a result of their value systems and cultures that are very conducive. Moreover, the successful benchmarked countries have been implemented the agendas of implementation properly for many years, and the achievements of the implementation were continuously monitored by an authoritative institution. Strong commitments from all stakeholders in construction sector to the agenda of implementation become one of their success factors besides the availability of effective indicators and assessment programs.

There are several challenges for Indonesia in establishing agendas of implementation in sustainable construction, such as the availability of reliable data related to sustainability issues that could be used as baseline for improvement; the availability of information on research activities and products related to sustainability issues; the need to have participations from all stakeholders to conduct initiatives in sustainable construction; strong commitments from all stakeholders to the implementation agenda; and coordination of stakeholders for orchestrated efforts towards effective sustainable construction agenda. Based on those challenges the Indonesian construction industry faced, it was suggested the implementation should focus on the following issues:

1. Moving from the already government-adopted weak sustainability approach to more integrated strong sustainability approach.
2. Improving public awareness in sustainable construction to be the primary driver that could answer other challenges in sustainable construction easier.
3. Research and development in construction design process, construction environment quality, re-engineering of development process, construction human resources, standard and code, and construction products.

The Ministry of Public Works had been launched what it is called a draft of Agenda 21 for Sustainable Construction in Indonesia (Goeritno, 2011). This draft agenda was a result of the two-year study conducted by the Ministry and several focus grouped discussions between the stakeholders of the Indonesian construction industry. The document itself was developed based on the document of the Agenda 21 for Sustainable Construction in Developing Countries by du Plessis (2002) with the national conditions in mind. The agenda was derived to achieving the three enablers, i.e., technology, institution, and value system enablers.

In that document, there are agendas that belong to the four groups of construction stakeholders, i.e., research and education institutions, construction practitioners, owners, and the government, and also there is an agenda that should be implemented by the Ministry of Public Works which is meant to be the prime mover of other stakeholders' agendas. All of those agendas are to be implemented immediately (short term, from 2011-2017), for medium term (2011-2024), and in the long run (2011-2030). This timeframe of implementation was determined based on the priority and how much efforts needed to implement. At the end this timeframe is also synchronized with the National Construction Industry Agenda 2030 (Suraji, 2007).

The Ministry of Public Works promoted and suggested the draft Agenda 21 for Sustainable Construction in Indonesia be used by other stakeholders as an initial document to be referred in discussions to develop more detailed and implementable agendas. Moreover, the document should also be a reference for developing strategic actions by all stakeholders as they have the same vision on what each party should contribute to the implementation of sustainable construction.

2. STRATEGIC ISSUES FOR IMPLEMENTATION OF SUSTAINABLE CONSTRUCTION AGENDA

CIB (1999) suggested the use of four possible strategies for change towards sustainable development that were listed in a UK Report's "The Greening of Industry for a Sustainable Future," published by the Advisory Council for Research on Nature and the Environment and the Greening of Industry Network in 1997. The strategies were proposed to provide a framework for analyzing the opportunities which could be taken by construction industry of any countries. The strategies are: the "defensive" strategy: complying with regulation; the "offensive" strategy: beyond compliance; the "eco-efficiency" strategy: win-win solution for reducing environmental impacts and cost; and the "sustainability" strategy: the ideal strategy and holistic approach.

Based on previous analysis on the existing conditions and practices of the Indonesian construction industry, and referring to the CIB's proposed strategies for change, the "defensive" strategy is considered to be the most appropriate strategy for Indonesia. The defensive strategy is very typical response from the majority of construction practitioners who are driven mostly by regulations to improve their quality of products. The majority of the Indonesian construction industry's stakeholders still have low level of environmental awareness and understanding, even though there would be some notable exceptions. In their view, the cost of addressing the sustainability issues to their products is considered as the cost of compliance with the regulations and minimum standards. Therefore, the cost of non-compliance becomes the primary motivator for any improvements. The construction industry's stakeholder will continue to follow this situation until the market changes its demand for sustainability issues. In this defensive strategy, any government-led initiatives, by incentives or regulations, should be put first and have significant portion and priority in the implementation.

For the last three years, the Ministry of Public Works has worked on formulating the strategic issues towards implementation of sustainable construction in Indonesia. The defensive strategy was then definitely utilized in the case of Indonesia, since the market's demand on sustainability issue is still considered low and the construction industry always await regulations from the government to step forward on any important issues. In this situation, it is very important that the Ministry of Public Works have an agenda of the implementation that could be well accepted and effectively supported by all stakeholders. However, several strategic issues for implementation of sustainable construction in Indonesia have been identified as follows:

1. **Adoption of Agenda 21 for Sustainable Construction in Developing Countries.** It is strongly recommended that the Ministry of Public Works adopt the already available international agenda in sustainable construction to be implemented in Indonesia, i.e., the Agenda 21 for Sustainability Construction in Developing Countries (du Plessis, 2002). This is due to the fact that there are a lot of similar existing sustainability conditions in Indonesia that also characterized the developing countries, despite the fact that some conditions in Indonesia are better. Research and development agenda, as well as the strategy for actions recommended in the Agenda 21 for Sustainability Construction in Developing Countries are also relevant. It means that Indonesia will have a research and development agenda to fulfill three enablers and strategies for actions for each sector of stakeholders as mentioned in the adopted agenda.
2. **Immediate Action.** The Ministry of Public Works should prepare a strategy to gather all willing stakeholders and to embrace them to have the same commitment and spirit stepping forward together to implement the associated agenda and actions in practice. A nation-wide consensus among the stakeholders is needed in developing and implementing the agenda and actions.
3. **Performance Indicators.** The adopted agenda is only a framework of planning and developing more implementable actions to be identified by each relevant stakeholder. Therefore, more detail actions need to be developed and should be set as part of the

consensus among stakeholders. Furthermore, in order to assure the high level of implementation of the adopted and developed agenda and actions, several performance indicators are needed to be identified to measure the achievement of the implementation and set as continuous monitoring and evaluation program. It is also suggested that these performance indicators are not only set to measure the achievement of R&D agenda and strategies for actions, but also to measure the achievement of sustainable construction in Indonesia in comparison to the ideal.

The drafted agenda, called Agenda 21 for Sustainable Construction in Indonesia (Goeritno, 2011), tried to address all of those issues. The Agenda has been launched by the Ministry of Public Works, and it was also declared that the Ministry of Public Works, as a representative of government, should be the leader among all Indonesian construction industry stakeholders in the implementation phase of the agenda. Several focused group discussions and workshops to disseminate the agenda have been done since early months of 2011. Yet, the responses from stakeholders were not as much as expected. At the beginning of 2012, an evaluation on the effectiveness of the previous year dissemination activities of the drafted agenda was conducted. It was found that the not-so-good responses from stakeholders are due to the following conditions:

1. The government, as a regulator, enabler, and facilitator, in Indonesia is not only the Ministry of Public Works. Problems of coordination between ministries related to construction supply chain in Indonesia, as well as, related to sustainable development, existed and made a non-conducive atmosphere for the implementation.
2. Moreover, it seems that the Ministry of Public Works is considered not yet credible enough to be the leader among the government agencies due to lack of previous practices, policies, and experiences in promoting the sustainability issues in construction industry.
3. Existed champions in sustainable construction are not adequately supported and promoted by government yet.

Based on those findings, in year 2012, the government agencies related to construction and sustainable development has begun to coordinate more effective under what so-called a joined secretariat. Nonetheless, this secretariat still needs higher-level thrust to support their inter-ministry coordination and activities. Moreover, the Ministry of Public Works has been conducting many programs in disseminating the sustainable construction concept to all regional and municipal public work agencies in Indonesia and investing a capacity building program and human resource development in sustainable construction for its managers and technical staffs. Some notable activities that have been done in 2012 and will be done in 2013 are:

1. Development of manual for delivering green construction projects in public sector
2. Development of needed standards/codes for supporting green construction
3. In-house trainings of green construction for manager and technical staffs
4. Dissemination of sustainable construction concept to public works agencies
5. Development of green road rating system
6. Development of green public procurement system for infrastructure
7. Study on risk management of green construction project
8. Study on the readiness of green construction supply chains
9. Development of information system to support implementation of sustainable construction in Indonesia

3. AGENDA FOR GREEN CONSTRUCTION IN INDONESIA

The document of Agenda 21 for Sustainable Construction in Indonesia also put emphasis on the importance of construction processes and products in the implementation of sustainable construction during the process of construction; recently this is called more often as green construction. In this case,

the designers and, especially, constructors play very important roles. It is said that the designers and constructors should have programs, in short-term as well as medium and long term, to address the improvement of their construction practices and products, such as:

1. **Design Process.** Construction design, both product design and process design, should be environmental friendly and involved as many parties as possible in earlier stages.
2. **Construction Environment Quality.** Construction field is considered to be unique compare to manufacturing production location. Hence, temporary organization with unique working environment makes the management of the environment quality is not stable and rather difficult.
3. **Re-engineering of Development Process.** Innovations to the development processes, such as re-engineering, are encouraged to provide more eco-efficient processes through the life cycle of the development.
4. **Construction Products.** Products related to components of a construction should also be produced by ecological way. The embodied energy to produce the products should be minimized. During the assembly on construction site, the operation should also minimize the use of energy as well as the consumption of the natural resources.
5. **Human Resources.** Construction process needs to be performed by adequate and multi-skilled human resources. The needed human resources should be capable to adopt new technology and material that satisfies the criteria of sustainability.

Moreover, to implement the sustainable construction, the education is aimed to improve the awareness and understanding of all of construction stakeholders and to provide professional human resources in construction. Another important issue is the availability of standards/codes. It is a real and immediate need to have a proper standard and codes that will guide the practitioners in construction to implement the sustainability issues. The standards and codes should be developed based on the local wisdom that utilizes local resources.

Since the practices of doing research and development in construction firms are considered low in everywhere around the globe, nonetheless in Indonesia, the most important issue here is how to improve the research and development activities, since they are considered as the main gate to innovations. Supports from all of stakeholders to embrace the research and development related to sustainability issues in construction should be addressed firmly. The capability of research and development of construction firms in Indonesia should be elevated through effective collaboration between the construction firms and universities or research institutes.

4. RECENT GREEN CONSTRUCTION DEVELOPMENTS

While the government has set an initial and necessary initiatives in implementing sustainable construction in Indonesia, the practitioners has also been beginning to consider sustainable practices, especially in the area of green buildings. It seems that 'green' terminology is more tempting to be used instead of 'sustainable', and buildings are more controllable compared to other types of construction.

Some large contractors, as the main subjects in the construction field, had shown their awareness and stewardships to the environment by declaring themselves as green contractors. They have implemented reduce, reuse and recycle (3R) principles, as well as the reducing the use of energy in their construction projects. International certifications for environment management (ISO 14000s) have been their marketing weapons besides the certification of health and safety management from OHSAS nowadays. The practices of reducing the use of papers, catering waste, the use of air conditioning, the use of water and electricity has been their day to day operation in their project sites. Moreover, they tried to introduce their innovations in transportation for project's labor, the use of alternative materials that are environmental friendlier, such as plywood, aluminum, light weight steel, and precast concrete.

Recently, there was a study conducted by the Ministry of Public Works that was aimed to measure the readiness of Indonesian large and medium-size contractors to implement the sustainable construction. In general, they are ready to implement the sustainable construction concept with the average score of 74, out of 100 (more on the methodology of the assessment system could be found in Wirahadikusumah and Ario, 2012). However, there are big differences in score of readiness for contractors that are located in Java Island and the ones that are not. The large and medium contractors located in Java are more ready since the demand to implement the sustainable construction is higher from the owner of the projects. This findings is, of course, very encouraging for the implementation of sustainable construction in Indonesia, but it is also shown that only maximum 10% of the registered contractors in Indonesia that are ready, while the rest (90%) are small-size contractors and they would have lower level of readiness.

One of other prominent movements in sustainable construction in Indonesia is the establishment of Green Building Council Indonesia (GBCI) in 2008. This is a not-for-profit and independent organization established by 50 core founders, who were individual professionals and practitioners, and 20 corporate founding members. Those founding persons and organizations are developer, designer, architect, building and facility management, contractor, supplier, architects, mechanical and electrical engineer, interior designer, and landscape. The GBCI is also representing the World Green Building Council (WGBC) in Indonesia. Until now, there are more than 120 corporate members joined this organization, one new green building projects and one existing building that had received platinum level of certification, and there are more than 16 green building projects that had received design recognitions. The assessment system that is published by the GBCI is called Greenship rating tools which consists of three rating tools: for new buildings, for existing buildings, and for interior spaces. The rating categories of Greenship for new buildings are:

1. Appropriate site development (ASD)
2. Energy efficiency and conservation (EEC)
3. Water conservation (WAC)
4. Material resources and cycle (MRC)
5. Indoor air health and comfort (IHC)
6. Building and environment management (BEM)

On the other hand, the government, represented by the Ministry of Environment, has issued a regulation on criterion and requirements for an institution that could publish an assessment system for certifying green buildings in Indonesia. At the end of 2012, the government, represented by the Ministry of Public Works, would also be issuing a standard of green building in Indonesia as a complementary of the previous regulation. In fact, starting this year, in the city of Jakarta, as the capital city, green building certification is a mandatory for new as well as existing buildings based on the Governor Decree. Even though the requirement to adopt green building concept in Jakarta is considered mandatory, it is a minimum level of green specifications that are achievable and processed as part of getting building permits for new buildings and operation permits for existing buildings.

Furthermore, green contractors in Indonesia already had their own assessment systems to measure the level of greenness of their projects. As an example, P.T. Pembangunan Perumahan (PP), the pioneer in green contractor in Indonesia, has an instrument that is called Green Contractor Assessment Sheet. This sheet is a form-based assessment for measuring the following categories:

1. Appropriate site
2. Energy efficiency and conservation
3. Water conservation
4. Site environment management
5. Material sources and cycle
6. Site health and comfort.

Other green contractors have their own systems that are slightly different but most of them have the same principle categories of measurements.

Other movements related to green construction in Indonesia is coming from the universities with their research agendas. Advanced researches in the use of recycle materials, especially concrete since it is the major construction material in Indonesia, have been done several years ago and this time is the time to realize the benefit of this kind of research to the construction projects. The high volume fly ash (HVFA) concrete, geopolymer concrete, recycle aggregate concrete, and pervious concrete have been very exciting fields of research areas recently. Some applications have been seen in the construction projects in Indonesia. Moreover, some researches to support the implementation of sustainable construction in Indonesia have also been conducted and they will support the development of necessary green supply chain system for construction in Indonesia (Abduh and Fauzi, 2012a).

5. IMPROVEMENTS NEEDED FOR GREEN CONSTRUCTION INITIATIVES

Besides enthusiasm from seeing the recent conditions of Indonesia in implementing sustainable construction, some issues should be addressed as a result of some studies conducted recently on the assessment systems, i.e., green building certification and also green contractor assessment. Those assessment systems are formal products that are available nowadays and could govern most of the practitioners in Indonesia. Even though the government has stepped into the playing field, especially for green building assessment, to influence the direction of initiatives, the practices still heavily focus on the design phase of the building. Whilst, the green contractor assessment tools also have their focuses on the way the contractors practicing their house keeping works on site. Those assessment systems were developed to be implementable easily and then to award the predicate to the assessed parties or projects. They are mostly document-based systems. So, they just become exciting new businesses, and seem to be a monopoly since those assessment systems are the only one available, and the first one to be developed in Indonesia.

While they measure many categories of green buildings and green construction, they are not intended to measure how green operations and processes are during the construction phase. Those assessments systems would be beneficial only to develop green designs as well as green house keepings and behavior during construction, but they lack of incentives for the contractors to search for innovations of their operations during construction. For some green projects or green buildings, they might get the green design recognitions and are constructed by green contractors, but the contractors should deploy the project acrobatically in order to fulfill the green specifications already recognized. The contractors' acrobat considerably will produce waste all the time during construction. At the end, the green construction projects may not be green anymore, even though they received green certifications afterward.

By analyzing the categories used in the Greenship for new green building, there are only 4.5% of them are related to assessing the operation during construction. The rest categories are related to building design (62.2%) and operation of building (33.3%) (Ervianto et.al. 2011). This findings showed the emphasis of this rating tool more to design and operation of green building compared to construction process of the building itself. Moreover, Abduh and Fauzi (2012b) studied the process of assessment using Greenship in a real case study of green building project. It was found that the categories related to the operation and process during construction, i.e., material resources and cycle category and building environment management, are hardly to be implemented properly due to unsupportive construction supply chains in Indonesia to the green movements and lack of inspection activities during construction in a document-based assessment system like Greenship. The green contractor assessment sheet lacks of the same issues of the Greenship, since its categories are very comparable to the Greenship's.

Those findings showed an improvement opportunity for the construction practitioners in implementing green construction in Indonesia. The assessment system, even though it is not the most important thing, eventually could give incentives and drivers for changing the practices. Therefore, an improvement of the available assessment systems related to the green construction should be introduced and developed.

In principle, the assessment of green construction should begin with the individual behavior and contractor organization practices. This aspect is called Green Behavior and Practices (GBC) (Abduh and Fauzi, 2012b). The big challenge for the contractor to implement this aspect is related to how to manage paradigm shift of the individual and changes in the organization to be greener. In the assessment system, this category should measure how well the contractor personnel behave in a green way and how well the contractor organization introduce the green practices as a standard operating procedure.

Other aspect to be considered in delivering green construction is related to the operations or processes of construction itself at the field. This is a production problem. Therefore, the operations or processes of construction at the field should minimize waste and on the other hand should maximize value to be delivered. This aspect is called as Green Construction Processes (GCP). However, this aspect is already known as lean construction principle. In the assessment system, this aspect should be addressed by measuring the waste produced by each operation or process of construction in the field and how good is the achievement to the value defined by the succeeding operations or processes and the final customer (Abduh and Fauzi, 2012b).

The last but not the least, there is another aspect that is very important to support two previous aspects of green construction, it is called Green Supply Chains (GSC). This aspect is important due to construction operation or process need materials as the major input for transformation to the final product of construction. The green materials should be managed by a proper green supply chains. Every member of the construction supply chains should contribute to the achievement of green value defined by the final customer. In the assessment system, therefore, there should be categories to measure the process of procuring green suppliers and how good their performances are (Abduh and Fauzi, 2012b).

6. CONCLUSION

Indonesia has analyzed the possible implementation of an agenda for national movements in sustainable construction. Different stakeholders in Indonesia have established the starting point to embrace sustainable construction principles. While the barriers for effective implementation are complex, a defensive strategy has been adopted by the government. The draft of a national strategy had already been disseminated through the assistance of various groups: the wider sectors within the government, the academics, and the professionals. Yet, national consensus requires persistent efforts by these concerned groups.

The majority of the Indonesian construction industry's stakeholders still have low level of environmental awareness and understanding, even though there would be some notable exceptions. In their view, the cost of addressing the sustainability issues to their products is considered as the cost of compliance with the regulations and minimum standards. Therefore, the cost of non-compliance becomes the primary motivator for any improvements. The construction industry's stakeholder will continue to follow this situation until the market changes its demand for sustainability issues. In this defensive strategy, any government-led initiatives, by incentives or regulations, should be put first and have significant portion and priority in the implementation.

Moreover, any initiatives from all stakeholders should be embraced, supported and guided, as much as possible by the government. Yet, they are not only beneficial to only parts of concerned group in

Indonesian construction industry, but they should also become incentives for other parties to join the implementation of sustainable construction in the right and meaningful directions.

Green construction movements, as one of the example of implementation effort of sustainable construction, should be directed to the proper understanding of the importance of every single phase and stakeholders in the value chain of sustainable construction. Construction operations and processes in the field are important as much as other phases of construction, therefore, more attentions from all of stakeholders, especially for research and development, should be put to deliver the green construction in a proper and meaningful way. Three aspects of green construction, i.e., green behavior and practices, green construction processes, and green supply chains, should be addressed adequately.

7. REFERENCES

1. Abduh, M, and Fauzi, R.T. (2012a). Contribution of Green Construction to the Realization of Green Buildings, Proceedings of the Indonesian Society of Civil and Structural Engineer's Seminar and Exhibition 2012, Jakarta 10-11 July 2012, Indonesia.
2. Abduh, M, and Fauzi, R.T. (2012b). A Study on Construction Processes Assessment of the Greenship Rating Tools. To be published in the Proceedings of the 6th National Civil Engineering Conference, Jakarta 1-2 November 2012, Indonesia.
3. Ervianto, W.I, Soemardi, B.W., Abduh, M., and Suryamanto (2011). Development of Green Construction Process Assessment Model in Indonesia, Proceedings of the National Conference of Graduates Students in Civil Engineering (KNPTS) 2011, ITB Bandung, Indonesia.
4. du Plessis, (2002). *Agenda 21 for Sustainable Construction in Developing Countries*, International Council for Research and Innovation in Building and Construction (CIB) and United Nations Environment Program International Environmental Technology Centre (UNEP-IETC).
5. Goeritno, B. (2011). Draft Agenda 21 of Sustainable Construction in Indonesia. Proceedings of the International Seminar Toward Sustainable Construction in Indonesia. Center for Construction Delivery Development, Construction Development Agency, Ministry of Public Works. Jakarta, 14 June 2011, Indonesia.
6. Suraji, A. (editor) (2007). *Indonesia Construction 2030 for Built Environment*. National Construction Service Development Board. Indonesia. ISBN:978-979-26-5736-4
7. The International Council for Research and Innovation in Building and Construction (CIB), (1999). *Agenda 21 on Sustainable Construction*. CIB Report Publication 237.
8. Wirahadikusumah, R. and Ario, D. (2012). Readiness Assessment Model for Indonesian Contractors in Implementing Sustainability Principles, under review in the International Journal of Construction Education and Research, Taylor & Francis.