THE CONSTRUCTION SECTOR OF INDONESIA*

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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 sligtly 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 Trilion 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 201 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 privarte partnership financing schemes. For the fiscal year 2012, the goverment 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, t 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 18th Asia Construct, 2012

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 sligtly 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 occuring 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

(1,000,000 IDR)

INDICATORS	2008	2009	2010	2011	2012	2013* (fc)
GDP at constan prices 2000 Rp. Billion	2,082,104	2,165,388	2,286,650	2,412,076	2,050,100	709,507.4
GDP at current market price	4,954,029	5,152,190	5,440,713	6,165,836	7,020,000	2,375,330.9
GDP growth (%)	6.06	4.00	5.6	6.50	6.4	5.83+
GDP growth (%) for agriculture, forestry and fishery sector	4.77	3.57	2.9	3.4	3.9	6.16
GDP growth (%) for manufacturing sector	3.66	4.38	3.6	5.0	6.3	5.55
GDP growth (%) for services sector	6.45	6.09	4.6	7.0	7.7	2.91
GDP growth (%) for mining sector	0.51	1.86	3.5	4.6	5.0	0.31
GDP growth (%) for construction sector	7.31	7.95	7.3	5.3	5.6	6.53
GDP growth (%) Financial, Ownership and Business Services	8.24	7.10	5,5	7.3	8.0	2.20
GDP growth (%)Transportation and Communication	16.69	14.43	11.9	13.8	15.1	3.28
GDP growth (%)Trade, Hotel and Restaurant	7.23	7.59	9.3	7.9	9.2	6.35
GDP growth (%)Electricity, Gas and Water Supply	10.92	8.33	7.2	4.2	4.2	5.80
Population (number)	227,779	230,633	237,556	241,417	244,775	
Population growth rate (%)	0.95	1.25	2.9	1.62	1.39	
Labour force (number)	111,879	113,852	116,000	109,67	112,80	
Labour force growth rate (%)	1.76	1.76	1,9	(5,4)	2,8	
Unemployment rate	9,427,590	9,258,964	8,595,600	7,700,220	7,610,000	
Unemployment growth rate (%)	(10.62)	(1.79)	(7.16)	(10.42)	(1.17)	
Inflation rate	10.31	6.02	5.67	5.38	4.23	
Short term interest rate (%)	16.62	17.12	17.56	17.58	18.00	
Long term interest rate (%)	13.90	14.87	15.18	15.27	16.00	
Changes in Consumer Price Index (2007=100)	170.18	186.16	118.37	114.59	131.92	
Average change against USD$	10,895	10,150	8,950	9,200	9,500	

Source: CBS (2009, 2010, 2011, 2012, 2013) & Central Bank of Indonesia (2009, 2010, 2011, 2012, 2013)

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 accellerate 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 infrstructure 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 Telecomunication 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 invesment 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 supervison 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 m^3. It is quite common to buy a truct of sand which is about 2.5 – 3.5 m^3 will cost about 300,000 up to 350,000 rupiahs.

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STRENGTHENING THE CONSTRUCTION SUPPLY CHAINS: INDONESIAN APPROACH IN CONSTRUCTION ECONOMICS PROGRAMS

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ABSTRACT: As defined, construction economics is the application of the techniques and expertise of economics to the study of the construction firm, the construction process and the construction industry. Its purpose would be the improvement of the areas of the study. In Indonesia, recent developments led by the government are focusing on the improvements of the structure of construction industry. As known by most of the construction practitioners, the construction industry has a fragmented structure with many small to medium sized firms that ultimately this fragmentation is the industry's cause of poor performance. The response is then to impose policies for project supply chain integration with the assumption that this will ensure industry development. This paper discusses an effort driven by Indonesian government in construction economics program to strengthen the existing construction supply chains. The strengthening strategy was to provide policies for implementing Supply Chain Management (SCM) practices in construction industry. The potential impacts of the policies to the structure of construction supply chains and also potential benefits for the members of the SCM were simulated.

KEYWORDS: construction economics, construction supply chains, fragmentation, integration, structure of supply chain.

1. INTRODUCTION

The Indonesian construction industry contributes to the wealth of a nation; construction sector contributes about 6.5% of the GDP and around 6% of national labors depend on this sector (Statistics Indonesia, 2013). The construction industry is characterized by business and process fragmentation because the structure of project organization is complex and has many phases. Process integration for the construction industry has been an attractive topic for researchers and practitioners in this industry since integration can benefit all parties involved in a construction project. As of May 2013, there were 117,042 registered contractors in Indonesia; 941 or 0.8% of them are big size contractors; 11,002 or 9.4% are medium size; and 105,099 or 89.8% are small size contractors (Husaini, 2013). The distribution of construction works are not even among the contractors. In year 2012, total value of construction was Rp. 324 Trillion and about 85% of them were performed by big size contractors. The concentration ratio for 8 biggest contractors (CR_8) are still 0.2; which means that the market is considered competitive for big contractors. In addition, most of the contractors are categorized as generalists than specialists. The above information concluded that fragmentation also occurs in Indonesian construction industry. This is of concern of construction practitioners in Indonesia, since the performance of construction industry would have potential impacts to the economics of the nation.

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The problem of integration has been identified in the last 15 years and there were evidences that it will give significant negative impacts, i.e., low productivity, cost and time overruns, conflicts and disputes, and resulting claims and time-consuming litigations. These have been acknowledged as the major causes of performance-related problems facing the industry. The legacy of this high level of fragmentation is that the project delivery process is considered highly inefficient in comparison with other industry sectors (Tucker et al. 2001).

The discipline of construction economics has emerged to answer the problem as the application of the techniques and expertise of economics to the study of the construction firm, the construction process and the construction industry. Bröchner (2013) believed that a closer engagement with economic theories of industrial organization will provide public policy makers with a better understanding of incentives for efficient of scare resources in the construction, and this new emerging discipline could provide instruments in reforming construction industry. Within this discipline, there has been a growing recognition that it is important to integrate the various disciplines/participants in a construction project including integrating all the members of the supply chain.

2. CONSTRUCTION SUPPLY CHAINS

Studies by Bertelsen (1993), indicated project cost increases of up to ten percent because of poor supply-chain design. Supply Chain Management (SCM) analyzes the impact of facility design on the construction process and enables superior project planning and management, avoiding the fragmented approach of other methods. Through SCM, all parties are kept aware of commitments, schedules, and expedited activities. All the parties work as a virtual corporation that can source, produce, and deliver products with minimal lead-time and expense.

Vrijhoef and de Ridder (2005) explains that the supply chain is basically representing a series of serial and parallel connections between clients and suppliers leading to the delivery of one or more products to one or more end clients. Basic social and economic rules dictate that clients buy products when this adds value to them, and suppliers produce products when this delivers profit. Clients want to increase the value added, and suppliers want to increase their profit. These interests are basically opposite, however aimed at a common goal: the transaction at a certain price. In order to combine the interests of both clients and suppliers, two basic strategies are optional, based on a collaborative approach These strategies are firstly aimed at the increase of the total benefit (value minus costs), and then on sharing the benefit. In construction, this is often organized in a collaborative and dynamic process between suppliers and clients. This requires faith and trust of both clients and suppliers in a "dynamic approach" to define value, costs and price in a collaborative process, resulting in benefit for both. When the strategies are extended through the supply chain, basically the model will include multiple parties and thus multiple transactions. The strategy will then have to be collectively grounded, and must be aimed at achieving collective benefit for all parties. The complexity increases with the number of parties involved, and so does the level of coordination of parties.

The supply chain has been defined as 'the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer' (Christopher 1992). SCM looks across the entire supply chain, rather than just at the next entity or level, and aims to increase transparency and alignment of the supply chain's coordination and configuration, regardless of functional or corporate boundaries. The traditional way of managing is essentially based on a conversion view on production, whereas SCM is based on a flow view of production. The conversion view suggests that each stage of production is controlled independently, whereas the flow view focuses on the control of the total flow of production (Koskela 1992).

The construction industry is specialized and heterogeneous with varied structural and behavioral characteristics across individual markets. The greatest difficulty with supply chain management in

terms of construction research and practical application is that currently too little is known about these characteristics and how to describe them.

Researches in the area of construction supply chain in Indonesia have been recently emerged. Wirahadikusumah and Susilawati (2006) studied several high-rise building construction projects in Jakarta and portrayed the construction supply chain patterns, general as well as specific patterns found in those projects. This initial understanding of the characteristics of construction supply chains was then followed by a study on developing their performance indicators (Wirahadikusumah et al. 2008a). These indicators were developed based on the three concepts of lean construction, i.e., "conversion," "flow," and "value." The proposed system can be used as a tool in assessing the effectiveness and the efficiency of the chains.

Wirahadikusumah et al. (2008b) have also used the performance indicators to obtain general portrayal of the construction supply chains on high-rise building projects. The study found that in general, Indonesian large construction firms have managed their supply chains but mainly with regard to the concept of "conversion." These firms have maintained long-term relationships with major suppliers and subcontractors. The companies use centralized procurement for main materials and distribute them to projects around the country as needed.

The management practices related to the "flow" and "value" concepts have yet to be implemented. Efforts in managing the "flow" include identifying and minimizing non value-adding activities. Achieving the value as requested by the client is the main goal of the whole production processes. However, in general, contractors have been focused on fulfilling the contract clauses with limited regards for conducting lean production process while at the same time they need to focus more on the client's satisfaction.

Another research by Abduh et al. (2012) was aimed at identifying the cost structure of construction project supply chain and the influencing factors. Research findings are not too compelling in terms of data collected, but it suggests an important issue on the way Indonesian construction companies manage their cost control systems. The cost structure or account for construction projects in general was not yet satisfactorily developed. It appears that the firms do not require classifying the level of detail of its cost structure in view of the fact that there is no necessity to maintain job cost information as well as to adequately control the project. Likewise, cost structure of construction supply chain differs to the manufacturing industry, in which the cost structure of supply chain is very detailed in order to be able to track down all information of expenses, and to manage the activities, as well as to identify opportunities to chop down particular expenses. In general, it seems that the less competitive environment of Indonesian construction industry would be the biggest major factor that caused the findings.

Furthermore, the study also found that the cost of purchasing was very significant in supply chain activity due to merely cost of material purchased. To the contrary, costs of transportation and inventory were trivial. From this finding, it can be concluded that efforts to reduce supply chain cost by reducing costs of inventory and transportation would not be effective. Factors that could influence the cost of supply chain, especially cost of purchasing, therefore are much related to management of supply chain, such as procurement policy, material requirement planning, supplier qualification, selection process, contract, and supplier development.

3. CHALLENGES FOR THE INDONESIAN CONSTRUCTION SUPPLY CHAINS

Moreover, Abduh (2012) mentioned three more problems faced by construction industry in Indonesia related to its existed supply chains, they are:

1. There is no competition among the existed contractors' supply chains; some of the reasons are due to lack of real competitions among contractors, no demand on managing supply chains from the owners, ad-hoc and temporary relationships among parties in the existed supply chains, and no loyalist in the existed supply chains.
2. There is always a difference between members of supply chains performing the execution of the project and members that were proposed in the bids; some of the reasons are due to lack of SCM practices in contractors, limitation to have eligible sub-contractors in a project, no unbiased protection to the sub-contractors, and no incentives to have long-term relationship between project participants.
3. There is no natural localization of contractors in Indonesia; some of the reasons are due to much intervention from the big national contractors to local district projects, no capacity buildings for local district contractors, and vertical integration practices by some state-owned enterprises.

The Indonesian government, represented by the Ministry of Public Works, has been very keen to solve the problems. There have been three national seminars conducted and the establishment of four working groups by the Minister of Public Work to work on those issues since two years ago. One of the working groups (i.e., WG2) was specialized to analyze the effectiveness of Supply Chains Management (SCM) practices in solving the problems. It was suggested by the WG2 that there were two levels of challenges in implementing SCM in the Indonesian construction industry; they are in the level of construction firms and in the level of construction projects (Figure 1).

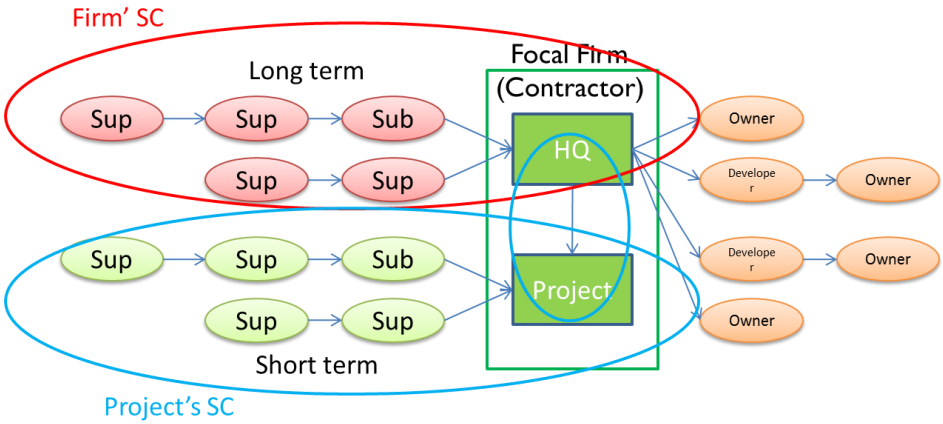

Figure 1: Typical Model of Construction Project's Supply Chains

In construction firm level of supply chains, the challenge is to implement the best practices of SCM effectively by the contractors, especially big size ones. SCM is aimed at coordinating or integrating a number of product-related activities among supply chain participants to improve operating efficiencies, quality, and customer service in order to gain sustainable competitive advantage for all of the organizations involved in the collaboration. SCM is considered as extended version of the management of logistics of an organization by including or integrating the supply networks and distribution network to it. Some important elements of SCM that should be considered in the implementation are purchasing system, operation system, distribution system and integration.

Meanwhile, in construction project level of supply chains, there are two major parties that could deliver the management of the supply chains. Firstly is the owner, and the second one is the contractor itself.

Evidently, the owners have been concerned on the value of the constructed facilities delivered by contractors as well as by the contractors' supply chains, i.e., suppliers and sub-contractors. The

concerns were practiced in the form of evaluation criteria of contractors' proposals that should include the assessment of the adequacy of contractors' suppliers and sub-contractors, and also in the form of owner's inspection and control on the products delivered by suppliers and the works performed by the sub-contractors in the field. Yet, these practices do not give the owners further involvement in establishing and configuring the supply chains of the projects, and therefore do not control the fulfillment of the defined value directly; it is performed through the contractors instead. It has been identified by Wirahadikusumah and Abduh (2010) that there are three models of construction project supply chains (SC) based on the owner's involvement, i.e., i). SC nominated by owner (NO); ii). SC created by owner (CO); and iii). SC managed by owner (MO). The three models have different levels of owners' involvements in the construction project supply chains, while concurrently managing their value chains. In this case, the ability of the owner in preparing the packages of construction works based on the available construction supply chains is imperative.

However, contractors have a central role in the management of construction supply chains. A general contractor has a potential to improve the performance of the whole construction supply chains by better coordination with the parties involved in formal and direct contracts, and with the parties which have contracts with the owner as well. To address the issue of fragmentation in the construction industry, the adversarial attitudes, the inefficient use of labor, the wastage of materials, the high cost of construction and the functional inefficiencies of buildings, contractors can play a significant role. Contractors can start replacing short-term, contractually driven single project adversarial inter-company relationships with long-term, multiple project relationships based on trust and cooperation. These long-term, strategic supply chain alliances incorporate continuous improvement targets to reduce costs and enhance quality, and focus on the through-life cost and functional performance of buildings. The lack of trust and the dominance of lowest bid procurement within the construction supply chains are not easy to tackle, however general contractors need to take the lead since studies have shown the potential benefits for them and the parties within the supply chains.

4. PROPOSED POLICIES

Based on the challenges as mentioned above, the Indonesian government was profound to implement supply chains management in construction for answering them in its construction economics program. It is believed that the performance of the construction industry is dependent on the performance of its supply chains. Moreover, the performance of the supply chains will be shaped by the dynamic interaction between the structure of the supply chain and the conducts of its members. Hence, in order to improve the performance of construction industry, the structure of supply chains and the conducts of the members of supply chains should be taken care of by the government.

An effort to strengthen the construction supply chains in Indonesia has been conducted since the last two years. The strategy chosen by the government was to implement Supply Chain Management (SCM) practices in construction companies and projects, as well as in the industry level. Several policies for executing the strategy have been developed including the following:

1. Advising the construction projects' owners to proportionally consider the existed supply chains related to their projects in preparing their work packages with the main objective is to achieve the values demanded by the owners.
2. Promoting the elimination of regulation that limited numbers of eligible sub-contracting in a construction project.
3. Promoting the implementation of Supply Chain Management (SCM) practices in construction firms; especially for big-size and the state owned contractors.
4. Forcing the big size contractors to implement partnering with local contractors in delivering their construction projects, to empower the local contractors, and to include the local contractors in their SCM systems.

5. Promoting the medium and small size contractors to be specialist rather than generalist contractors and practicing under big size contractors' SCM. For this, the classifications of contractors, as well as their definitions, are important to be settled first.
6. Providing productive and conducive subcontracting environment and mechanisms to protect the subcontractors properly in their businesses.

5. POTENTIAL IMPACTS OF THE POLICIES IN SCM

In order to validate the premises of the developed policies, a what-if analysis to estimate the impacts of the policies to the structure of supply chains and also benefits for contractors involved in the SCM has been established. A static, deterministic, and discrete simulation model has been developed to compare between the existed structure of construction supply chains in Indonesia and the managed structure by SCM. Moreover, in regards to whether the SCM arrangement would benefit the members of the SCM, especially for medium-size and small-size contractors, potential improvement of profit per project has been simulated as well. Yet, the simulation model used for the purposes is still in development stage. However, as of this paper was written, the model has revealed a promising result. The model was developed based on the structure of supply chains in a project level as depicted in the following Figure 2.

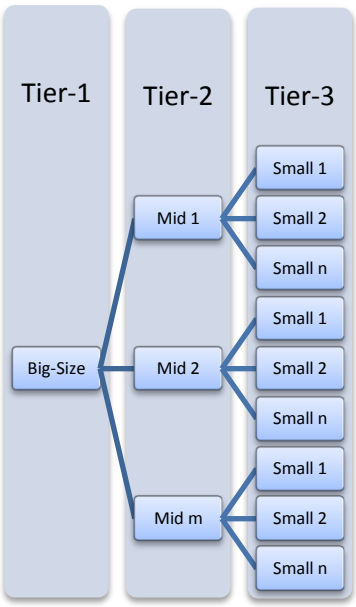

Figure 2: Typical Structure of Construction Supply Chains Project of Big-size Contractor

The assumptions made for the simulation were derived from authors' experiences, and previous studies by Bertelsen (1993), Wirahadikusumah and Susilawati (2006), and Department for Business Innovation and Skills (2013); a formal survey is being conducted to validate the assumptions. The assumptions are as follows:

- The structure of construction supply chain project follow the model in Figure 2; big contractors (tier-1) will be supported by several medium-size contractors in tier-2 (m) and then also further supported by several small-size contractors in tier-3 (n).
- Construction market shares for big, medium, and small sizes contractors are 85%, 11%, and 4% respectively.

- Average contract values for construction projects performed by big, medium, and small sizes contractors are Rp. 100 Billion, Rp. 7.5 Billion, and Rp. 0.65 Billion respectively.
- Average number of big-portion work sub-contractors in tier-2 (n) is 5, and the average number of big-portion work sub-contractors in tier-3 (m) is 4.
- Average percentages of profit per project for big, medium, and small sizes contractors are 6%, 8%, and 10% respectively.
- Average percentages of indirect costs per project for big, medium, and small sizes contractors are the same: 20%.
- Average percentage of works sub-contracted is 60% of the contract value excluding profit and indirect cost of the tier-1 and tier-2 contractors.
- There are 45% of subcontractors in tier-2 that work at the same time to other tier-1 or the same tier-1 contractors.
- There are 10% of subcontractors in tier-3 that work at the same time to other tier-2 or the same tier-2 contractors.
- Firms that actively compete for getting jobs from the owners in their own markets are 80%, 60%, and 40% for big, medium-size, and small contractors respectively.
- A contractor that has already implemented SCM will execute the project by distributing the works mostly to its own SCM members.
- Better coordination will be gained by implementing SCM and it will reduce the indirect cost of the project, i.e., procurement cost, to 10%.
- SCM will create loyal sub-contractors and therefore will reduce number of sub-contractors that work at the same time to other tier-1 contractors to 40%, and will reduce number of sub-contractors that work at the same time to other tier-1 contractors to 5%.

Based on the assumptions and current data of the market of construction supply chains in Indonesia (as of May 2013), the simulation model produced the following findings:

1. Supply Chains Management (SCM) would increase the number of impacted medium-size and small-size contractors involving in construction projects (as sub-contractors in tier-2 and tier 3) as much as 688 (6.3%) and 2,754 (3.6%) respectively (Figure 3).

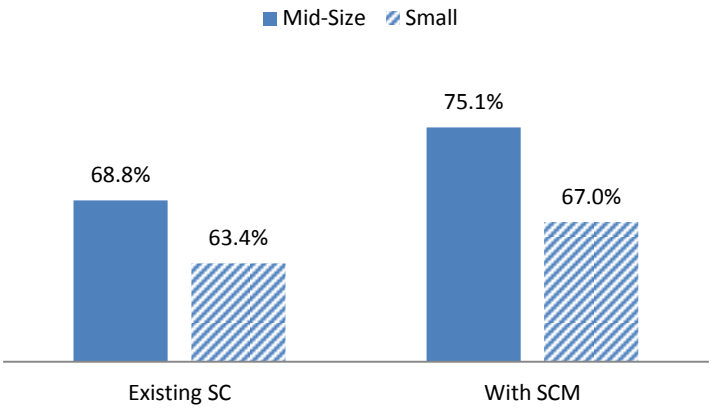

Figure 3: Percentage of Sub-contractors Involved in Construction Projects

2. Supply Chains Management (SCM) would increase the average annual profits of impacted medium-size and small-size contractors by working for big contractors as much as 13.5% and 29.3% respectively (Figure 4).
3. Supply Chains Management (SCM) would increase the average annual profits of impacted small-size contractors by working for medium-size contractors as much as 42.5% (Figure 5).

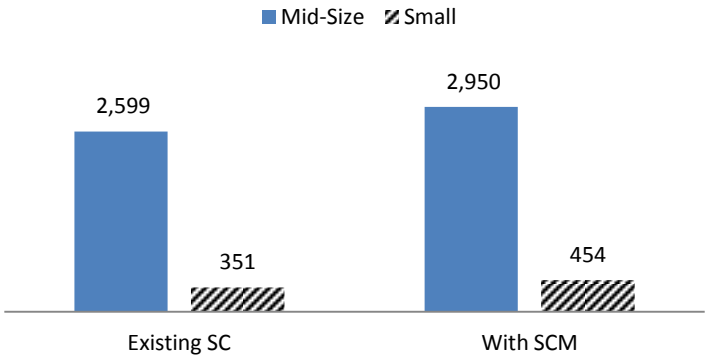

Figure 4: Annual Profits of Sub-contractors Working for Big-Size Contractors (in Rp. Million)

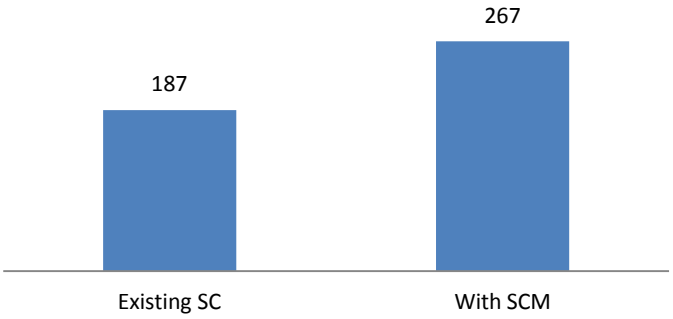

Figure 5: Annual Profits of Sub-contractors Working for Medium-Size Contractors (in Rp. Million)

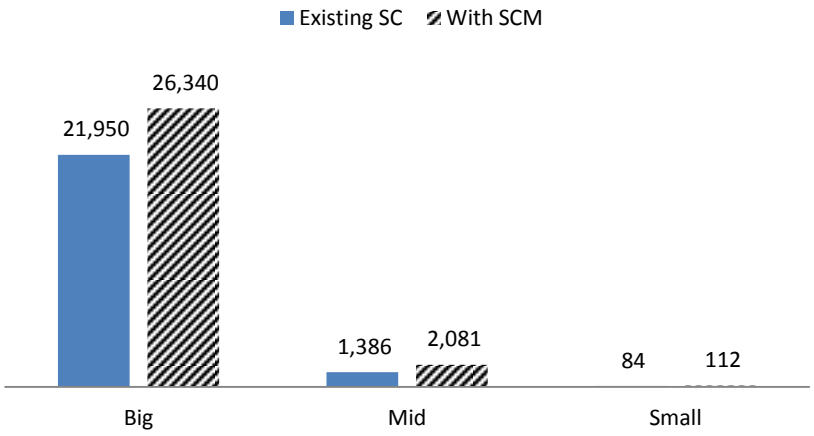

Figure 6: Annual Profits of Competing Contractors (in Rp. Million)

4. Supply Chains Management (SCM) would also affect the rest of contractors that are not involved in SCM. By implementing SCM in big-size and medium-size contractors, numbers of medium and small size contractors involved in SCM are increasing. Meanwhile, the

number of rest contractors that are not involved in SCM is reduced. Therefore, there is higher probability for them to get jobs from the owners in competitions and would lead to increased profits as well. On the other hand, the better coordination and less indirect cost caused by implementing SCM would benefit also the big-size contractors that implement SCM. Based on Figure 6, the most potential increased annual profit would be gained by medium-size contractors (50%). Small size contractor would also potentially increase its significant annual profit as much as 33%. On the other hand, the big-size contractor would potentially gain 20% more of their annual profit by implementing SCM.

5. By comparing Figure 4, 5, and 6, it can be concluded that the implementation of SCM by big-size contractor would benefit mostly to the medium-size and small size contractors that are involved in the SCM. The potential increased in annual profit for them (Figure 4 and 5) are higher than the contractors that are not involved in SCM (Figure 6).
6. It also can be concluded from the results above that the implementation of SCM would benefit more to the small-size contractors than medium-size contractors. The potential annual profit for small-size contractor that is involved in SCM would be 2 up to 4 times higher than the one that is not involved in SCM. In the meantime, the potential annual profit for medium-size contractor that is involved in SCM would only 1.5 times higher than the one that is not involved in SCM. This finding would then be an opportunity to empower the small size contractors by increasing their involvements in big and medium size contractors' SCM.

6. CONCLUSION

Indonesian government has been keen to implement supply chains management in construction for answering latent problems faced by the industry in its construction economics program. It is believed that the performance of the construction industry is highly correlated with the performance of its supply chains. On the other hand, the performance of the supply chains is determined by the interaction between the structure of the supply chain and the conduct of its members. Therefore, in order to improve the performance of construction industry, the structure of supply chains and the conducts of the members of supply chains should be managed carefully by the government.

Problems and challenges in managing construction supply chains in Indonesia have been identified. The government tried to minimize them since they will cause poor performance of the Indonesian construction industry. An effort to strengthen the construction supply chains in Indonesia has been conducted since the last two years. The strategy chosen by the government was to implement Supply Chain Management (SCM) practices in construction companies and projects, as well as in the industry level. The policies prepared to execute the strategy has been developed including the elimination of limitation of eligible sub-contracts in a project, definition of generalist and specialist contractors, standardization of sub-contacting, and manual of SCM practices for contractors and owners. A simulation of the proposed policies has been also established to estimate the impacts of the policies to the structure and conducts of the members of the Indonesian construction supply chains. Promising potential benefits for both are initially found. Furthermore, the SCM implementation would also be an opportunity to improve and empower small size contractors that are the majority of the population and problems.

7. ACKNOWLEDGEMENTS

The authors are members of the Working Group 2 (WG2): Strengthening the Construction Supply Chains; one of four working groups engaged for preparing policies and regulations for improving the structures of the Indonesian construction industry. The substances of this paper are taken from the WG2 report to the Indonesian Ministry of Public Works. The WG2 activity is supported by the Center for Construction Delivery Development, Construction Development Agency of the Ministry of Public Works. The authors also wish to express their gratitude to other members of the WG2 for their supports and time given to the working group.

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19th ASIA CONSTRUCT CONFERENCE
14th to 15th November, 2013
JHCC, Jakarta , Indonesia

IMPROVING THE CONTRIBUTION OF CONSTRUCTION SECTOR IN REDUCING THE COMMUNITY DISASTER RISK : CASE OF EARTHQUAKE RISK IN INDONESIA

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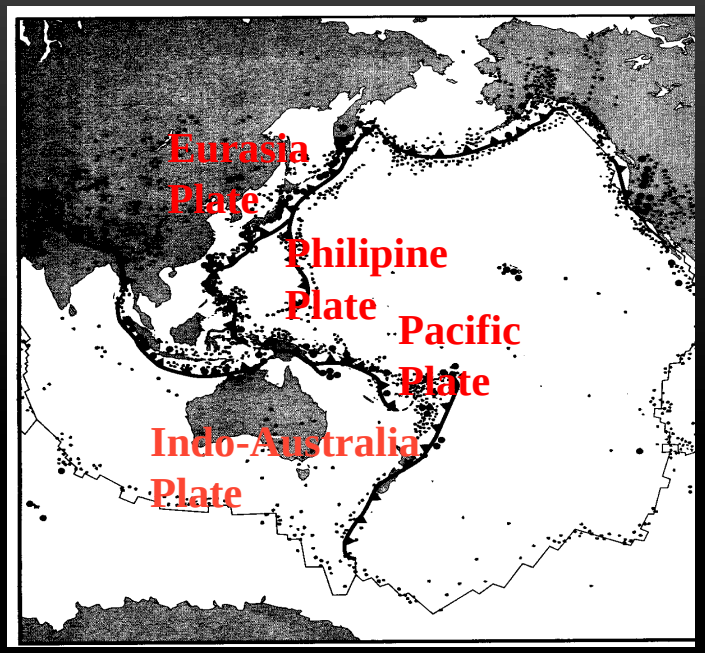
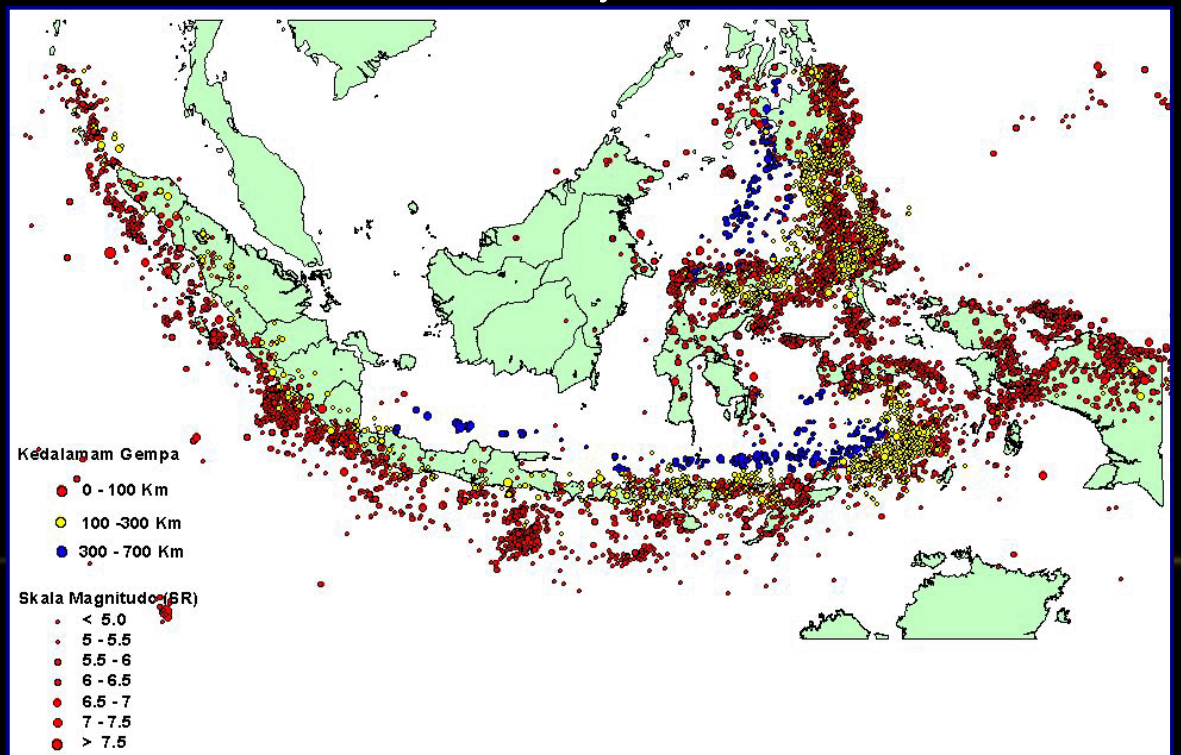
PRESENTATION OUTLINE

- Introduction
- Disaster Risk and Construction
- Role of Construction Industry in Reducing Disaster Risk
- Survey on the Source of Seismic Vulnerability of Buildings in Construction Process
- Experience from Recent Earthquakes
- How to Improve Construction Sector in Reducing Earthquake Vulnerability
- Concluding Remarks

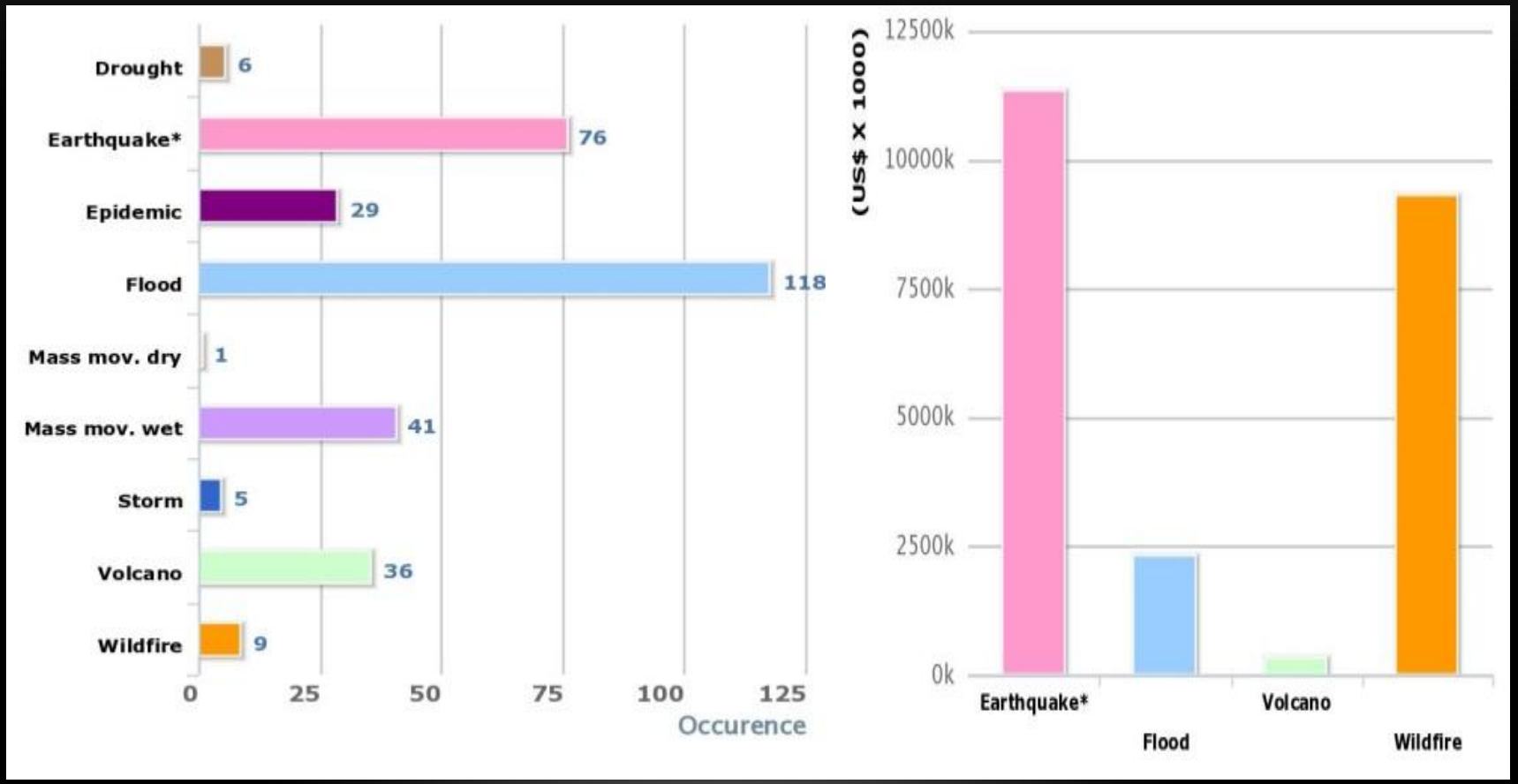
INTRODUCTION

- Indonesia, disaster prone country :
  - >13.000 islands,
  - 1.922.570 km2 of lands and
  - 3.257.483 km2 of marine territory





Indonesia :
Number of disaster and disaster losses from 1900 – 2011



(http://www.preventionweb.net/english/countries/statistics/?cid=80, accessed 8April 2013)

RECENT MAJOR EARTHQUAKES OCCURRENCES IN INDONESIA

No	Earthquake Event	Magnitude	Loss of life	Displaced person	Damaged Houses	Destroyed Houses
1	Aceh E/Q (and tsunami), December 26, 2004	M 9.4	110,000	700,000	57,137	69,932
2	Nias E/Q, March 28, 2005	M 8.6	850	40,000	71,891	12,010
3	Yogyakarta E/Q, May 27, 2006	M 6.8	5,700	600,000	260,000	154,000
4	Bengkulu E/Q, September 12, 2007	M 8.5	35		390,825	19,375
5	West Java E/Q, September 2, 2009	M 7.4	81	178,490	216,424	46,697
6	West Sumatra E/Q, September 30,2009	M 7.6	1,117	-	249,833	114,797

ROLE OF CONSTRUCTION IN DISASTER RISK

- Casualties and economic losses due to damages of both engineered and non-engineered buildings and infrastructure
- Buildings and infrastructure often performed poorly because of vulnerable construction materials and practices.
- Community vulnerability to earthquake in Indonesia caused by:
  - Unchecked development process under pressure of population and economic growth
  - People living under poverty line
- The construction sector (informal and the formal) may contribute to both building and infrastructure resilience and vulnerability at the same time,

DISASTER RISK AND CONSTRUCTION

- disaster risk is “the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period” (UNISDR Terminology, 2010)
- Disaster risk factors : hazards, vulnerability, capacity

- **Construction :**
  - defines the vulnerability of the built environment.
  - Includes planning, design, procurement, construction, commissioning, operation and maintenance and demolition of the construction products
  - involves a series of institutional actors and regulations, manufacturing and distribution activities, project management, and site production activities

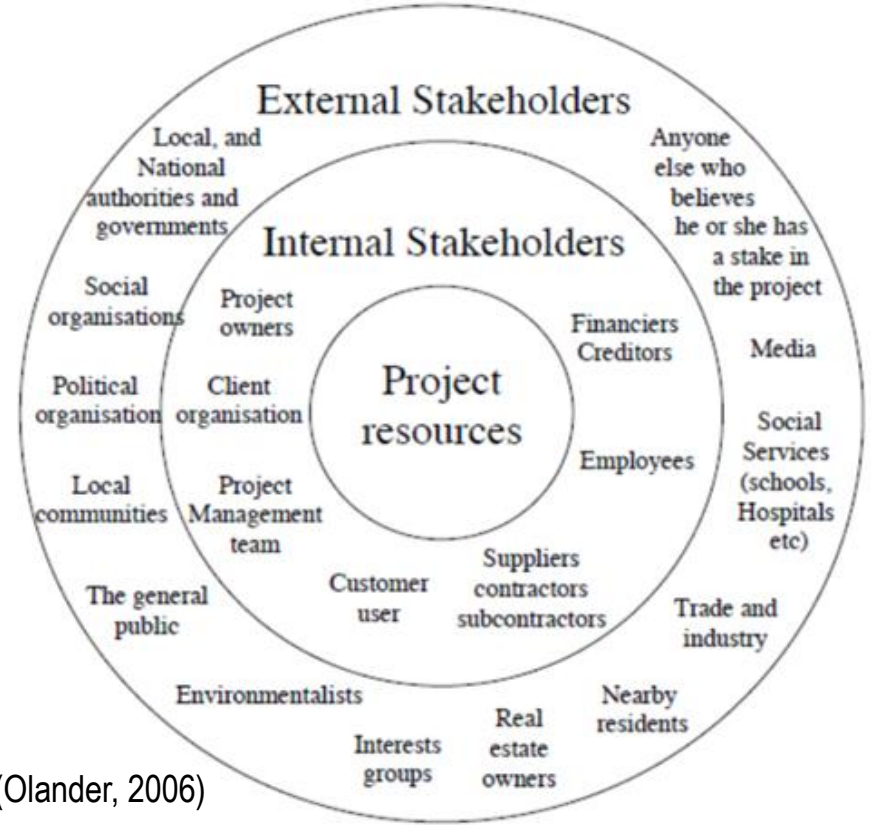
ROLE OF CONSTRUCTION INDUSTRY IN REDUCING DISASTER RISK

- role of the construction industry in disaster management : pre-disaster, during disaster, post -disaster
- pre- disaster vulnerability reduction activities : design and construction of structural construction projects to reduce vulnerability to disasters, land use planning etc.
- Post-disaster vulnerability reduction activities : anticipating and assessing future disaster risk in order to better prevent and/or prepare toward future disruptive shocks in the case of disaster event.
- “build back better “ construction process.

ROLE OF CONSTRUCTION INDUSTRY IN REDUCING DISASTER RISK

Role of the construction industry stakeholders :

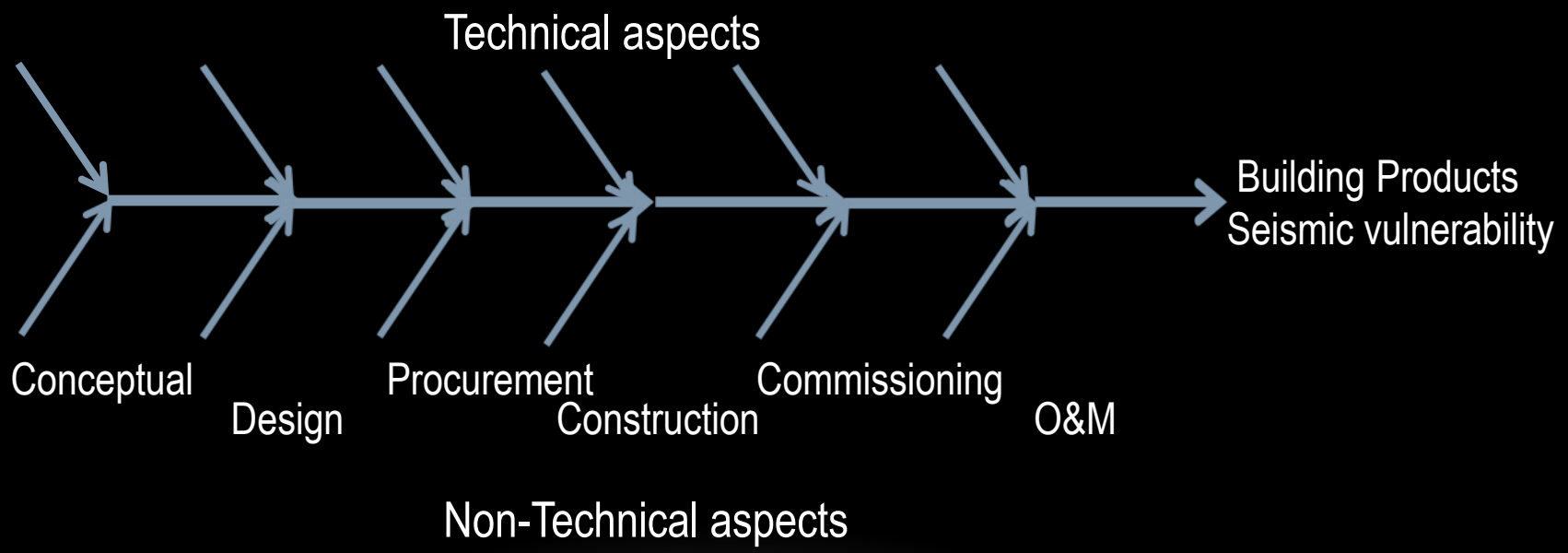
- internal stakeholders : defining values to be adopted by the construction process and ensuring that reducing disaster risk is part of the values
- external stakeholders : give pressures to the internal stakeholders in order values pertinent to disaster risk reduction implemented by the internal stakeholders.



(Olander, 2006)

A SURVEY ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

- Survey to respondents representing different stakeholders in the construction process



SURVEY RESULT ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

Phase	Technical	Non-technical
Conceptual	• Vulnerable location (limited options, incompliance to land use) • feasibility and EIA studies not available or just formalities • Inappropriate need assessment • Concept not following stakeholders requirement	• Traditional values and beliefs, • Fatalistic attitude • Ignorance to earthquake and earthquake resistant technology • Following traditional forms or "imported" building style (material, form) while ignorant to the structural consequences • Inadequate dissemination, no risk awareness • Political aspiration of the local ruler, not need based • Deviation to land use plan due to political and economical pressure • Bad coordination among agencies • High cost for risk and environmental impact assessment • Weak law enforcement

A SURVEY ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

Phase	Technical	Non-technical
Design	• Inadequate or invalid data (soil, hazard etc.) • Hasty design process • Owners do not obey earthquake resistant requirements • Incomplete design criteria, drawing and specification • Incompetent designer/engineer	• Earthquake prone area selected due to various reasons • Not enough information on land use plans • Traditional forms not suitable to new building materials (masonry/concrete) • Inconsistencies in applying building regulation (only for government buildings) • Low capacity from the community for hiring professional engineers • Budget limitation and lower priority for earthquake resistance

A SURVEY ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

Phase	Technical	Non-technical
Procurement	• Inadequate building permit process, building permit only as formality, no design verification • Incompliance to building permit • Improper procurement process resulting in incompetent contractors, no “value for money”, just cheapest • Inadequate risk assessment to A/E and contractors • Unsuitable project delivery method	• Disobeying issued building permit • Lowest price approach • Incompetent builders selected due to various reasons • Political intervention in appointing contractors

A SURVEY ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

Phase	Technical	Non-technical
Construction	• Non-compliance to drawing and specification • Discontinuity of materials supply, resulting in different material quality • Inadequate supervision and control • Inadequate details in the design • Repeated design changes during construction • Inadequate material inspection and quality control	• Non-standardized skills of autodidact builders/tradesmen • Non-compliance to specification as a "culture" to increase profit margin • Inadequate commitment of supervisor/inspector • Traditional collective work with inadequate technical knowledge • Pressure from outside groups (money extortion for security reason) • Bellow-standard materials (exp. Steel reinforcement bars) due to weakness in government control • Corruption • Inadequate field inspection from building control agencies

A SURVEY ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

Phase	Technical	Non-technical
Commissioning	• Inadequate commissioning procedure • Inadequate acceptance criteria • Underestimating commissioning procedure • maintenance training	• building occupation by owner before commissioning • regulation on the assessment for occupational worthiness not in place

A SURVEY ON THE SOURCE OF SEISMIC VULNERABILITY OF BUILDINGS IN CONSTRUCTION PROCESS

Phase	Technical	Non-technical
O & M	• No or inadequate operation and maintenance manual • no or inadequate operation and maintenance training • inadequate maintenance • use of building beyond its operational life • building use different with initial building function which change the loading characteristics • inadequate assessment for building occupational- worthiness • modification of building ignoring existing capacity of structural elements	• low awareness on the need of proper maintenance • maintenance considered as waste • reactive maintenance instead of preventive maintenance • absence of regulation on routine maintenance • maintenance budget not prioritized • policy for reducing or omitting maintenance budget to save money (in short term)

EXPERIENCE FROM RECENT EARTHQUAKES

- Non-engineered buildings , Central Aceh 3 August, 2013

EXPERIENCE FROM RECENT EARTHQUAKES

- Non-engineered buildings , Central Aceh 3 August, 2013

EXPERIENCE FROM RECENT EARTHQUAKES

- Engineered (school) building , Central Aceh 3 August, 2013

ENGINEERED BUILDING, EARTHQUAKE IN BANDA ACEH 2004

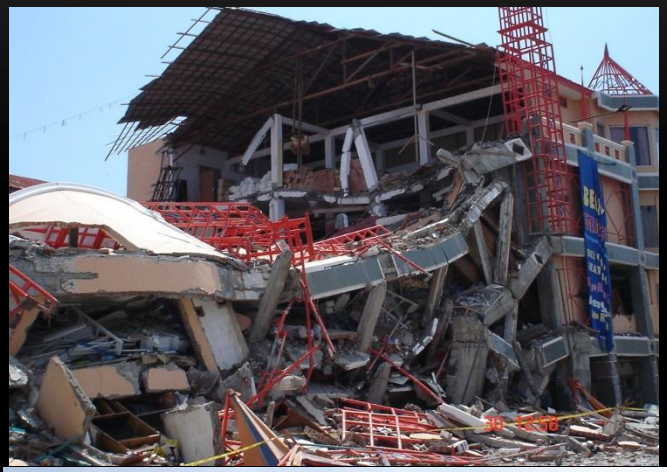


Photo source: Wayan Sengara, PhD.

ENGINEERED BUILDING, YOGYAKARTA EQ 2006

WEST SUMATRA 2009

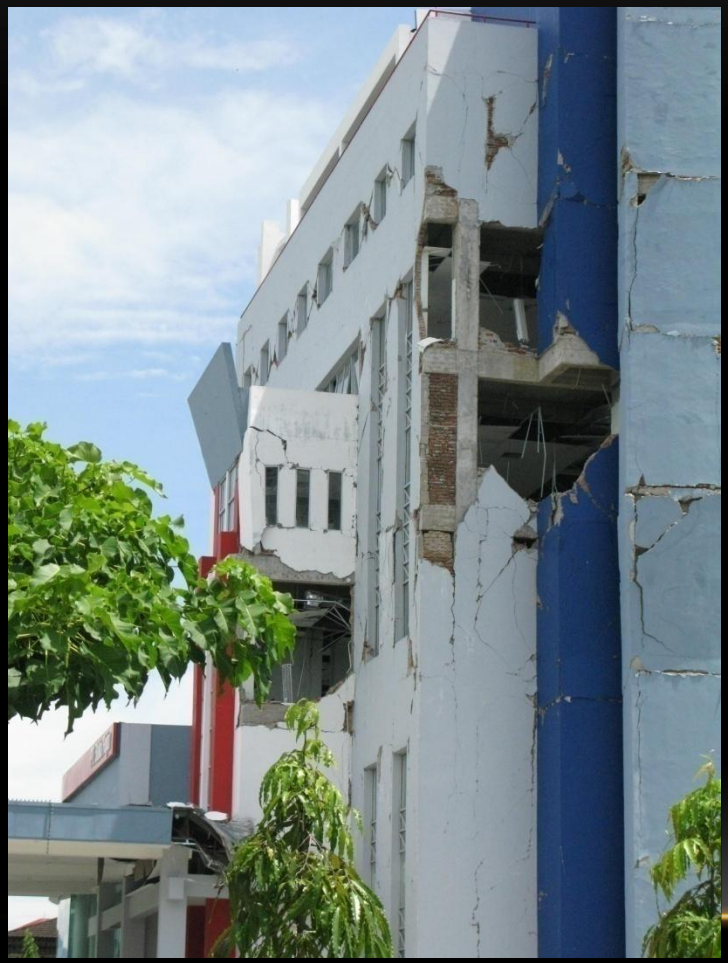


Foto: I Wayan Sengara, 2009

COLLAPSED ENGINEERED STRUCTURE IN PADANG, 26 SEPT 2009

Soft story collapse of a Government building

(Courtesy: Teddy Boen)

COLLAPSED ENGINEERED STRUCTURE IN PADANG, 26 SEPT 2009

- Damaged houses and buildings did not apply good earthquake resistant building practices as well as the prevailing building codes in Indonesia, such as the size and quality of reinforcement bars, proper dimension and spacing of stirrup, improper construction materials, in particular concrete mix and materials which produce very low quality of concrete.
- Many damaged houses were found to be using heavy concrete canopy in front of the house, tied to the small RC tie beams that connect the walls to the roofs. Dari wawancara di lapangan dengan pemilik bangunan dan tuka
- Most of the masons, carpenters and concreter and steel bar benders have very limited knowledge on earthquake resistance technology.
- Most of the house owners either build themselves their houses or assign builders to build their houses without awareness of the earthquake risk in the area. They just trust the local builders to design the structural features of the houses, without the capacity of ensuring whether the masons understand or not earthquake resistant technology.

HOW TO IMPROVE CONSTRUCTION SECTOR IN REDUCING EARTHQUAKE VULNERABILITY

Elements in building the construction industry to contribute positively to the reduction of disaster risk (Ofori, 2004):

- Develop a regime of statutory regulations and codes which guides planners and designers to take preventive action, and contractors to produce items of the requisite quality and durability.
- Build an efficient and effective enforcement framework to give practical effect to the regulations.
- Instill within the construction industry an adequate capacity and capability to undertake designs which give due cognisance to the possibility of all forms of disasters in the particular context of the locations of the items, and in particular for Indonesia as an earthquake prone country, the capacity toward seismically safer buildings.
- Ensure that contractors should be able to produce sound construction.

HOW TO IMPROVE CONSTRUCTION SECTOR IN REDUCING EARTHQUAKE VULNERABILITY

(i) Human resource development at all level to equip construction professionals with the knowledge and skills required to undertake appropriate designs and construction .

(ii) Proper registration of contractors and builders to ensure that they will be updated in terms of construction technology required to reduce disaster risk

(iii) Ensure that good quality construction materials are available within the reach of various economical capacities of house and building owners.

(iv) Develop new materials and technology to cater to the need of various users in different parts of the country, in order that earthquake resistant buildings and houses are economically feasible and reachable.

(v) Develop the industry technical and technological capacity to handle various projects with enough protection to the disaster risk, catering the needs of different types of clients (formal and informal sectors) in pre- and post-disaster situation

(vi) Develop and disseminate user friendly information materials on method and good practices in disaster risk reduction, and in particular, earthquake vulnerability reduction, for the public and for the construction industry.

THE DISASTER RESOURCE PARTNERSHIP (DRP) INDONESIA

- A global alliance of Engineering and Construction (E&C) companies supported by the World Economic Forum.
- Aims to promote “cross- sector, professional, scalable and accountable humanitarian response to disasters that has the ability to meet growing demands to reduce suffering and save lives’ and that promotes an ongoing collaboration between the global humanitarian community, national governments and local E&C companies.” (WEF 2010).
- DRP Indonesia National Platform has ten member companies : PT. PP (Persero), PT. Wijaya Karya (Persero), PT. Jaya Konstruksi Manggala Pratama, PT. Total Bangun Persada, PT. Tatamulia Nusantara Indah, PT. Waskita Karya, PT. Amec Berca Indonesia, PT. Balfour Beatty Sakti Indonesia, PT. Yodya Karya (Persero), and Davy Sukamta & Partners.

THE DISASTER RESOURCE PARTNERSHIP (DRP) INDONESIA

Modes of intervention :

- Direct action: Member companies operating in the disaster affected location immediately engage in emergency relief such as distribution of food, water, medical supplies and non-food items
- Secondments: Companies second individual staff members into NGOs or humanitarian agencies to enhance their capacities (usually when the company is not operating in the disaster affected area).
- Local technical services: Companies at a national level partner with local or national governments, academics, or NGOs to provide technical assistance. This could include, for example, clearing debris, repairing critical infrastructure, damage assessment and design, project management and construction expertise.

THE DISASTER RESOURCE PARTNERSHIP (DRP) INDONESIA

Example of action :

- Post M 6.1 earthquake in Aceh, in July 2013, a team of experts from Indonesia DRP was deployed in coordination with key UN organisations and government departments to conduct :
- damage assessment of community health facilities and general hospitals in the affected area and assessment of local capacities for reconstruction
- training of local builders on construction quality and earthquake-resilient housing design and construction.
- identified significant areas of improvement such as the need for building safety personnel at health offices and hospitals, enforcement of building codes and the need for a vocational engineering and construction school at district level.

(Personal communications with Victor Rembeth, project manager DRP Indonesia National Platform)

END OF PRESENTATION
THANK YOU FOR KIND ATTENTION!