Malaysia Country Report

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1. Executive Summary

The Malaysian economy recorded a higher, respectable growth of 5.6% in 2012. The construction sector expanded strongly at 18.1% in 2012 (2011: 4.7%), due to commencement and progress of several major infrastructure projects that also provided significant positive spill over effects to domestic manufacturing and services sector. The private sector continued its domination, obtaining projects awarded in 2012 worth RM101.3 billion or 85.2% of the total value of projects for the year. The public sector took a back seat with only RM17.6 billion or 14.8% of construction projects awarded for the same period. The main building material prices in 2012 increased marginally compared to 2011. Wages of construction personnel too were showing the same upward trend. The number of registered construction workers, as in previous years, steadily increased. Malaysian economy is expected to grow moderately in 2013 by 4.5% - 5.0%. Under the 2014 Budget, the government targeted the construction sector to grow by 10.6% in 2013 and 9.6% in 2014. CIDB estimated that the value of construction projects awarded may reach RM110.0 billion in 2013 and RM115.0 bilion in 2014.

2. Macroeconomic Review

2.1. Overview of the National Economy

<u>Overview of the Malaysian Economy in 2012</u>

The Malaysia economy performed better with a higher growth of 5.6% (2011: 5.1%). The growth was most supported by resilient domestic demand which recorded its highest rate of expansion for the decade at 10.6% (2011: 8.2%), supported by strong consumption and investment spending. Private consumption registered a firm growth of 7.7% in 2012. In the public sector, public consumption recorded a moderate growth of 5.0% amidst continued fiscal consolidation efforts during the year. Investment activity is driven by capital spending of both the private and public sector. Private investment recorded a double-digit growth of 22% and public investment also registered a strong growth of 17.1%.

On the supply side, all economic sectors continued to expand in 2012. The construction sector benefited from the strong expansion in investment activity, registering its highest pace of growth at 18.1% (2011: 4.7%) since 1995. The service sector continued to

expand by 6.4% (2010: 11.4%), followed by the manufacturing sector at 4.8% (2011: 4.7%) and the mining sector at 1.4% (2011: -5.5%). Labour market conditions remained stable in 2012 with continued gains in employment. The inflation rate was lower at averaged 1.6% in 2012 (2011: 3.2%), due to slower rate of price increases in the food and non-alcoholic beverages and transport categories.

Foreign direct investment (FDI) continued to register a sizeable net inflow of RM29.1 billion or 3.1% of GDP (2011: RM36.6 billion) in 2012. Interest rates remained stable in 2012 reflecting the stance of monetary policy to promote balanced and sustainable growth of the economy. The Overnight Policy Rate (OPR) is maintained at 3.0% throughout 2012 and base lending rate (BLR) of commercial banks remained at 6.5%. The Ringgit ended the year at RM3.06 against the US Dollar, thus recorded a year-on-year appreciation of 3.9%. The performance of the Ringgit was influenced by the global and regional developments amid periods of heightened volatility in the global financial markets.

Table 2.1 Malaysian Macroeconomic Overview

	2010	2011	2012
GDP growth by economic activity at 2005 constant price (RM million)			
Agriculture	51,263	54,253	54,782
Mining	66,182	62,565	63,432
Manufacturing	170,261	178,237	186,748
Construction	21,459	22,464	26,531
Services	359,829	385,179	409,976
Real GDP	**676,653**	**711,351**	**751,471**
GDP growth by economic activity at 2005 constant price (%)			
Agriculture	2.4	5.8	1.0
Mining	-0.3	-5.5	1.4
Manufacturing	11.9	4.7	4.8
Construction	11.4	4.7	18.1
Services	7.4	7.0	6.4
Real GDP Growth	**7.4**	**5.1**	**5.6**
Demographic Indicator			
Population (million)	28.6	29.0	29.3
Labour force ('000 persons)	12.3	12.70	13.1
Unemployment rate (%)	3.3	3.1	3.0
Financial Indicator			
Inflation rate (%)	1.7	3.2	1.6
Short term interest rate - 3 months (%)	2.74	2.99	2.98
Long term interest rate - 12 months (%)	2.97	3.22	3.15
Exchange rate at end of period (RM against USD)	RM3.08	RM3.18	RM3.06

Source: Central Bank of Malaysia Annual Report 2012.

Review of the Malaysian Economy in the First Half of 2013

The Malaysian economy continued to grow by 4.2% in the first half of 2013 (1Q 2013: 4.1%; 2Q 2013: 4.3%). In spite of prolonged weakness in the external sector, Malaysian economy was driven by a stronger expansion in domestic demand amid a further moderation in external demand. On the supply side, all economic sectors continued to expand further, with growth in the second quarter led by strong performance in the construction and services sectors. The construction sectors growth remained strong at 9.9% in the second quarter (1Q 2013: 14.2%). The growth was mainly driven by civil engineering and residential sub-sector such as the MRT, Tanjung Bin and Janamanjung power plant, Sabah-Sarawak gas pipeline and high-end residential properties in Klang

Valley, Penang and Sabah. The services sector registered a growth of 5.4% in the first half of 2013 (1Q 2013: 5.9%; 2Q 2013: 4.8%), the manufacturing sector grow slightly at 1.9% (1Q 2013: 0.3%; 2Q 2013: 3.3%), the agriculture sector expanded at 3.1% (1Q 2013: 6.0%; 2Q 2013: 0.4%) and the mining sector with a positive growth of 1.0% (1Q 2013: -1.9%; 2Q 2013: 4.1%).

3. Overview of the Construction Industry

3.1. Construction Project Review in 2012

The value of construction projects awarded in 2012 increased by 20.0% to RM118.9 billion (2011: RM99.0 billion), with the private and public sectors contribution of 85.2% and 14.8% respectively from the total value. Private sector projects value rose by 33.4% to RM101.3 billion (2011: RM75.9 billion) and the public sector projects showed a decrease of 24.0% to RM17.6 billion (2011: RM23.2 billion). As the economy continued to grow, more private investment activities took place and developers embarked on new construction projects. This is in line with the government's aim to push the private sector as the main driver of the economy. In terms of numbers, private sector secured 5,380 projects (2011: 5,607 projects) compared to 1,860 public sector's projects (2011: 1,921 projects).

Major contribution to Malaysian construction projects came from the implementation of 7 mega infrastructure projects each costing more than RM1.0 billion amounting to RM19.2 billion. Most of the projects are the Entry Point Projects (EPP) Economic as follows:

1. Underground works for Lembah Kelang Mass-Rapid Transit (MRT) in Kuala Lumpur worth RM8.3 bilion
   Award date : 30 March 2012; Expected completion date : 31 December 2016

2. 1x1000MW coal-fired power plant in Johor worth RM4.8 bilion
   Award date : 1 March 2012; Expected completion date: 1 March 2016

3. Fourth lane widening for PLUS highway worth RM1.4 bilion
   Award date : 6 July 2012; Expected completion date: 5 July 2015

4. System works for Lembah Kelang Mass-Rapid Transit (MRT) in Kuala Lumpur worth RM1.4 bilion
   Award date : 10 October 2012; Expected completion date : 31 July 2017

5. Viaduct guideway for Lembah Kelang Mass-Rapid Transit (MRT) Package V4 in Kuala Lumpur worth RM1.2 bilion
   Award date : 18 May 2012; Expected completion date : 18 May 2017

6. Viaduct guideway for Lembah Kelang Mass-Rapid Transit (MRT) Packace V1 in Kuala Lumpur worth RM1.1 bilion
   Award date : 18 May 2012; Expected completion date : 31 December 2016

7. LRT Ampang Line (AMG) extension works in Kuala Lumpur worth RM1.0 bilion
   Award date : 31 July 2012; Expected completion date : 31 March 2016

In 2012, infrastructure projects registered a value of RM42.6 billion (2011: RM32.4 billion), followed by non-residential projects at RM38.4 billion (2011: RM35.0 billion), residential projects at RM31.3 billion (2011: RM24.6 billion) and social amenity projects at RM6.6 billion (2011: RM7.0 billion). The project value had clearly been boosted by the infrastructure projects (35.8%) and led by the private sector with a share of 27.9% due to the high-value projects awarded under the sub-category of utilities and transport. Meanwhile, non-residential projects tendered a rose of 9.7% in 2012, mainly contributed by industrial and commercial subcategory.

Table 3.1 Value and Number of Construction Projects by Sector and Type

Sector and Type of Project	Value (RM)			
	2010	2011	2012	1H 2013
Total Private Sector	**71,417.60**	**75,882.58**	**101,253.29**	**33,818.01**
Residential	21,862.20	23,793.52	29,991.90	9,379.11
Non-Residential	29,255.66	32,257.67	35,282.12	17,055.60
Social Amenity	3,056.08	2,764.05	2,776.98	999.58
Infrastructure	17,243.66	17,067.34	33,202.29	6,383.72
Total Public Sector	**19,530.32**	**23,163.33**	**17,614.82**	**6,782.56**
Residential	1,340.19	838.15	1,314.74	755.41
Non-Residential	2,921.08	2,741.78	3,098.69	571.34
Social Amenity	5,868.31	4,243.34	3,838.87	1,377.18
Infrastructure	9,400.74	15,340.06	9,362.52	4,078.63
Grand Total	**90,947.92**	**99,045.91**	**118,868.11**	**40,600.57**

Sector and Type of Project	Number			
	2010	2011	2012	1H 2013
Total Private Sector	**5,439**	**5,607**	**5,380**	**1,793**
Residential	2,024	2,088	1,929	643
Non-Residential	2,207	2,259	2,199	685
Social Amenity	265	263	197	86
Infrastructure	943	997	1,055	379
Total Public Sector	**1,873**	**1,921**	**1,860**	**581**
Residential	119	141	187	40
Non-Residential	356	256	318	79
Social Amenity	587	583	628	156
Infrastructure	811	941	727	306
Grand Total	**7,312**	**7,528**	**7,240**	**2,374**

*As at 30 June 2013
Source: CIDB Malaysia

3.2. Contractor Registration

The number of contractors registered in 2012 increased by 8.9% to 69,786 (2011: 64,094 contractors). The number of registered contractors is expected to be maintained with the implementation of the Continuous Contractor Development (CCD) Programme in which every contractor is obliged to collect a certain number of CCD points based on their registration grade. The programme which was enforced on 1 January 2010 is to ensure that contractors increase their knowledge and be involved in construction related activities.

Total registration of small grade contractors of grade G1 to G3 was greater than the higher grade contractors due to less restrictive conditions of registration and lesser capacity requirement. The number of registered contractors in grades G1 to G3 was 79.4% (55,415) of the total registered contractors (2011: 51,376). The number of medium grade contractors of G4 and G5 accounted for 10.4% (7,239) of total registered contractors in 2012 (2011: 6,503). The number of high grade contractors of G6 and G7 was 9.8% (6,836) of the total registered contractors in 2012. All grades of contractor's registration except for G3 grade increased in 2012 compared to 2011. This was due to the contractors' growing capability and increased opportunities in construction. The number of registered foreign contractors in 2012 showed a significant change compared to 2011.

Table 3.2 Registration of Contractors

Grade	Bidding Limit	2010	2011	2012	1H 2013
G1	Not exceeding RM200,000	32,987	32,752	36,399	35,886
G2	Not exceeding RM500,000	8,077	8,187	8,665	8,765
G3	Not exceeding RM1,000,000	10,761	10,437	10,351	9,149
G4	Not exceeding RM3,000,000	2,766	2,686	2,922	2,996
G5	Not exceeding RM5,000,000	3,962	3,817	4,317	4,246
G6	Not exceeding RM10,000,000	1,507	1,398	1,692	1,654
G7	Unlimited	4,533	4,573	5,144	5,299
Foreign	Unlimited	196	244	296	303
Total		**64,789**	**64,094**	**69,786**	**68,298**

Source: CIDB Malaysia

3.3. Construction Personnel

A total of 1,844 architects and 955 quantity surveyors were registered as a profesional consultant, while a total of 1,654,000 construction personnel were registered in 2012. As in the previous years, the registration of consultants and construction personnel was balanced and did not greatly vary.

Table 3.3 Registration of Local Professional Consultants by Type

Type of Profesional Consultant	2010	2011	2012
Architect [1]	1,744	1,782	1,844
Quantity Surveyor[2]	859	911	955
Engineer[2]	4,784	6,841	N.A

Source:
[1] Board of Architects Malaysia
[2] Board of Quantity Surveyors Malaysia
Note : N.A – Not Available

Table 3.4 Registered Construction Personnel by Type

Category of Worker	2011		2012	
	Local	Foreign	Local	Foreign
General Worker	617,409	320,016	664,652	367,427
Skilled Construction Worker	154,612	8,398	155,317	8,174
Site Supervisor	113,417	1,077	116,406	1,382
Construction Manager	82,415	3,853	86,844	4,333
Administration Personnel	221,768	2,559	246,190	3,386
Total	**1,189,621**	**335,903**	**1,269,409**	**384,702**

Source: CIDB Malaysia

3.4. Construction Productivity

Value-added per employee in the construction sector rose significantly by 15.0% to RM22,799 per worker in 2012 (2011: RM19,817 per worker). The increase in productivity is expected to continue in the future as the execution of several mega projects in 2012 and more key projects identified under the Entry Point Projects (EPP) initiatives in 2013.

Table 3.5 Value-Added Per Employee

	2010	2011	2012
Construction Sector Value- Added (RM million)	21,459	22,464	26,531
Construction Sector Employee ('000 persons)	1,082.7	1,133.6	1,163.7
Value-Added Per Employee (RM)	**19,820**	**19,817**	**22,799**

Source: Central Bank of Malaysia Annual Report 2012.

3.5. Construction Cost

3.5.1. Tender Price Index

Building construction tender price indices showed an overall increase compared to the base year in 1980. In 1H 2012, tender price index showed an increase of 2.2% compared to 2H 2011 (411.36 point). In 2H 2012, the index added 8.83 points to make the tender price index rose to 429.32 points. The tender price index will continue to rise in line with the rising prices of building materials.

Table 3.6 Building Construction Tender Price Indices (1980 = 100)

Period		Tender Price Indices
2010	1H	410.18
	2H	398.59
2011	1H	408.49
	2H	411.36
2012	1H	420.49
	2H	429.32

Source: Average Cost per Square Meter for Building Work by Public Works Department

3.5.2. Average Price of Major Construction Material

In 2012, the average prices for major building materials such as cement, sand aggregate, ready mixed concrete and brick rose slightly between 0.2% to 2.2% (2011: between 1.6% to 13.3%). For steel base materials such as steel bar and BRC A10, the average price for both materials decreased between 0.4% to 0.1%. Diesel as one of the main raw material showed downward price trend starting from mid-2012. The highest average price for diesel has been recorded in March 2012 at RM3.29 per litre and it continued to decline by 19.5% to RM2.65 per litre in December 2012.

Table 3.7 Average Prices of Major Construction Materials in Malaysia (RM)

Category of Material	Unit	2010	2011	2012
Cement	5 kg Bag	15.87	16.44	16.76
Sand	Tonne	24.99	25.79	23.60
Steel Bar	Tonne	2,402.30	2,568.56	2,561.76
BRC A10	m²	18.72	19.35	18.93
Aggregate	Tonne	33.93	34.49	33.56
Ready Mixed Concrete	m³	254.88	262.48	253.11
Brick	Unit	0.32	0.36	0.37
Diesel (Industry)	Litre	2.47	3.07	3.00

Source: CIDB Malaysia

3.5.3. Construction Industry Wage Rates

Construction General Worker Wage Rates

Average daily wage rates for most categories of local skilled construction workers increases ranging from 0.1% to 5.3%. Among the categories of skilled construction workers experiencing a rising in minimum and maximum wage rates are concretor, carpenter - joinery and painter – building meanwhile, average minimum and maximum wage rate for skilled scaffolder - tubular experience a decrease. The highest maximum wage rate is earned by local skilled construction who works as a plumber-reticulation (RM125.03 per day) meanwhile; a bricklayer earned the lowest minimum wage rate (RM71.36 per day). Most of daily wage rates for local semi-skilled worker increased to an average of 0.3% to 13.3%. Among the categories of semi-skilled construction workers experiencing a rising in minimum and maximum wage rates are general construction worker - building, roofer and plumber - reticulation. The highest maximum wage is earned by local semi-skilled construction workers who works as a building wiring installer (RM115.75 per day) meanwhile, a general construction worker - building earned the lowest minimum wage rate (RM42.23 per day). In Malaysia, foreign construction workers earned lower wages than local construction workers.

Table 3.8 Average Daily Wage Rate for Construction Worker in Malaysia (RM per day)

Category of Worker	Minimum / Maximum Wage	Local Worker				Foreign Worker			
		Skilled		Semi-Skilled		Skilled		Semi-Skilled	
		2011	2012	2011	2012	2011	2012	2011	2012
General Construction Worker - Building	Minimum	-	-	39.92	42.23	-	-	36.08	36.38
	Maximum	-	-	63.50	71.39	-	-	56.48	59.75
Concretor	Minimum	66.93	70.53	53.10	55.50	58.53	58.87	46.31	48.38
	Maximum	102.94	105.80	85.90	87.30	90.11	92.43	72.28	75.00
Barbender	Minimum	74.67	77.81	57.61	58.07	61.77	60.95	44.91	46.05
	Maximum	105.92	104.94	83.19	84.14	83.44	85.61	67.02	71.19
Carpenter-Formwork	Minimum	79.13	80.99	61.09	62.95	64.88	66.10	51.29	56.13
	Maximum	109.45	110.28	88.08	91.06	91.61	91.89	77.47	81.19
Bricklayer	Minimum	70.59	71.36	48.86	50.72	52.93	56.49	41.56	42.62
	Maximum	101.63	102.94	80.36	79.53	82.40	85.57	68.22	66.46
Roofer	Minimum	81.46	81.51	61.90	66.93	67.81	69.89	49.91	53.85
	Maximum	115.19	115.53	90.81	92.44	101.15	98.08	81.56	80.56
Carpenter - Joinery	Minimum	84.36	86.16	66.44	70.41	71.04	73.59	54.23	56.91
	Maximum	119.17	121.19	100.26	98.72	107.34	103.72	86.11	87.14
Steel Structure Fabricator	Minimum	79.86	82.66	63.71	69.78	72.04	73.07	52.57	58.52
	Maximum	128.99	119.44	102.21	99.11	108.75	106.11	88.71	85.93
General Welder	Minimum	72.44	76.31	60.67	66.78	66.00	69.37	51.32	57.38
	Maximum	122.45	117.22	94.44	93.60	103.64	104.17	84.01	85.76
Plumber - Building & Sanitary	Minimum	75.98	78.52	59.63	60.63	63.51	64.53	47.83	49.09
	Maximum	112.42	111.67	89.60	90.03	94.22	95.22	75.82	78.86
Plumber - Reticulation	Minimum	81.47	81.38	63.31	71.73	67.33	70.51	50.69	60.35
	Maximum	119.57	125.03	103.27	105.25	105.70	108.58	88.83	91.81
Building Wiring Installer	Minimum	-	-	71.97	82.16	-	-	60.53	69.23
	Maximum	-	-	116.44	115.75	-	-	107.84	105.97
Electrical Wireman PW2 (RM Monthly)	Minimum	1,783.33	1,797.06	-	-	1,280.28	1,343.63	-	-
	Maximum	2,998.00	3,005.73	-	-	2,400.01	2,432.39	-	-
Electrical Wireman PW4 (RM Monthly)	Minimum	2,336.23	2,441.89	-	-	1,730.83	1,759.71	-	-
	Maximum	3,655.85	3,609.61	-	-	2,882.63	2,909.74	-	-
Scaffolder - Prefabricated	Minimum	74.81	77.88	57.94	59.12	60.69	62.38	48.17	51.68
	Maximum	110.64	110.03	94.69	92.73	96.33	97.34	82.79	83.97
Scaffolder - Tubular	Minimum	75.76	72.64	59.02	59.99	60.46	63.72	48.50	50.88
	Maximum	109.78	102.50	84.59	88.00	94.36	95.53	75.96	78.47
Plasterer	Minimum	77.52	77.96	56.18	59.63	58.54	58.83	46.12	44.55
	Maximum	111.70	105.66	89.73	89.97	89.81	91.89	78.67	80.86
Tiler	Minimum	81.64	82.91	61.27	63.17	65.73	67.42	48.67	50.83
	Maximum	115.06	117.34	93.86	93.14	95.47	96.97	79.60	84.11
Painter - Building	Minimum	70.06	72.33	53.06	54.40	57.30	59.39	45.65	46.43
	Maximum	104.18	105.54	83.27	85.31	85.98	89.56	69.08	72.08
General Construction Worker - Civil	Minimum	-	-	52.86	52.03	-	-	43.74	44.97
	Maximum	-	-	76.97	80.11	-	-	67.84	71.06

Source: CIDB Malaysia

Construction Machine Operator Wage Rates

The average daily wage for most categories of local skilled machinery operators increases in the range of 0.1% to 6.8%. Among the categories of skilled operators experiencing a rising of minimum and maximum wage rates are mobile crane, tower crane and slinger / dogger operators. Among the categories of skilled operators who experience a decrease of minimum and maximum wage rates are off road truck, backhoe loader and roller operators. The highest maximum wage is earned by local skilled operator who operates tower crane (RM113.39 per day) meanwhile a roller operator earned the lowest minimum wage (RM46.40 per day). Most category of local semi-skilled machinery operator experienced a decreased in average daily wage rate ranging from 3.8% to 0.3%. Among the categories of semi-skilled operators experiencing a decrease in minimum and maximum wage rate are rigger pile, off-road truck and wheel loader operators. Among the categories of semi-skilled operators who were experiencing an increase of minimum and maximum wage rate are tower crane operators. The lowest minimum wage is earned by semi-skilled operator who operates wheel loaders (RM36.78 per day) meanwhile tower crane operator earned the highest maximum wage rate (RM81.65 per day). In Malaysia, foreign construction machinery operator earned lower wages than the local construction machinery operator.

Table 3.10 Average Daily Wage Rates for Construction Machinery Operator in Malaysia (RM per day)

Category of Operator	Minimum / Maximum Wage	Local Worker				Foreign Worker			
		Skilled		Semi-Skilled		Skilled		Semi-Skilled	
		2011	2012	2011	2012	2011	2012	2011	2012
Excavator	Minimum	54.62	56.27	-	-	44.83	44.45	-	-
	Maximum	85.04	85.63	-	-	77.67	72.00	-	-
Pile Rigger	Minimum	50.67	52.51	39.27	38.47	46.21	46.54	35.26	34.67
	Maximum	85.08	83.65	66.89	65.60	78.54	76.05	60.63	61.08
Off Road Truck	Minimum	50.82	50.23	38.05	37.57	44.59	44.60	35.36	34.30
	Maximum	79.82	78.88	61.15	60.82	70.82	71.43	57.48	58.64
Backhoe Loader	Minimum	53.57	51.58	-	-	46.01	42.39	-	-
	Maximum	88.14	80.81	-	-	78.91	70.95	-	-
Roller	Minimum	48.37	46.40	36.32	37.60	44.51	43.69	33.77	32.84
	Maximum	85.64	83.57	62.09	61.10	72.83	74.01	56.04	57.57
Roller / Compactor	Minimum	47.49	49.61	36.70	36.58	44.96	44.69	33.81	34.01
	Maximum	81.89	81.19	63.57	62.32	73.21	74.24	57.18	60.26
Scraper	Minimum	49.39	51.66	38.51	38.75	46.69	47.04	35.44	35.84
	Maximum	80.86	81.37	64.02	62.07	75.64	74.66	61.11	62.09
Motor Grader	Minimum	47.89	51.17	-	-	44.23	43.60	-	-
	Maximum	83.34	83.33	-	-	74.48	76.83	-	-
Wheel Loader	Minimum	49.16	48.14	38.15	36.78	44.28	45.03	34.48	33.78
	Maximum	85.77	85.82	65.14	64.93	77.53	75.24	59.44	59.87
Paver	Minimum	51.21	52.16	39.78	40.35	47.38	48.43	35.08	35.61
	Maximum	81.43	84.52	64.58	63.88	76.02	75.03	60.49	61.41
Mobile Crane	Minimum	63.51	65.13	45.17	46.57	59.09	60.66	40.44	40.94
	Maximum	99.43	103.43	77.83	77.47	90.70	91.05	65.53	66.96
Crawler Crane	Minimum	62.85	65.22	46.68	48.54	59.09	59.24	41.64	42.15
	Maximum	99.30	100.00	73.57	71.92	90.59	88.12	66.66	67.56
Tower Crane	Minimum	64.83	69.22	46.25	52.35	57.26	62.16	40.53	41.17
	Maximum	111.02	113.39	80.73	81.65	101.62	98.82	72.37	74.27
Forklift	Minimum	50.11	51.55	36.32	38.04	44.32	44.39	33.56	31.81
	Maximum	79.12	75.69	62.24	59.90	73.02	70.10	56.09	56.10
Slinger / Dogger	Minimum	45.74	47.83	36.07	36.87	42.79	43.34	34.24	33.37
	Maximum	77.98	81.17	60.63	60.60	73.26	71.39	58.61	58.98

Source: CIDB Malaysia

IBS Installer Wage Rates

IBS installer in Malaysia comprises of only local workers. Average daily wage rate for most of skilled IBS components installer increases ranging from 0.4% to 10.6%. The highest maximum wage is earned by an IBS precast concrete installers (RM151.17 per day) meanwhile, a system formwork installer earned the lowest minimum wage (RM68.50 per day). Most categories of IBS semi-skilled components installer experience an increase of average daily wage rate ranging from 4.8% to 9.3%. The highest maximum wage is earned by an IBS precast concrete installers (RM100.50 per day) meanwhile, a roof truss installer (light gauge steel) earned the lowest minimum wage (RM53.17 per day).

Table 3.9 Average Daily Wage Rate for Local IBS Installer in Malaysia (RM per day)

Category of IBS Installer	Minimum / Maximum Wage	Skilled		Semi-Skilled	
		2011	2012	2011	2012
IBS Precast Concrete	Minimum	79.83	85.17	64.83	65.17
	Maximum	150.00	151.17	109.17	100.50
IBS Lightweight Panel	Minimum	72.67	80.33	59.83	63.33
	Maximum	130.17	130.67	104.17	97.67
Lightweight Block wall	Minimum	64.33	71.00	50.33	55.00
	Maximum	99.17	98.17	80.00	74.50
System Formwork	Minimum	65.17	68.50	51.83	54.33
	Maximum	98.33	107.83	80.83	87.33
Roof Truss (Timber)	Minimum	62.33	69.33	50.17	54.33
	Maximum	109.00	97.33	79.17	76.67
Roof Truss (Light Gauge Steel)	Minimum	65.67	69.17	50.17	53.17
	Maximum	110.00	105.67	85.67	76.67

Source: CIDB Malaysia

3.6. Export and Import of Construction Work and Consultancy Services

3.6.1. Annual Export and Import of Construction Work

In 2012, Malaysian contractors managed to secure 5 foreign projects worth RM1.6 billion (2011: 9 projects, RM8.5 billion) and all of the projects came from Middle East countries. The largest construction projects undertaken by Malaysian companies in foreign countries were the Second Package of Batinah Highway in Oman (RM1.0 billion) and Civil Engineering and Electromechanical Works for Al-Zuhour Water Project in Baghdad, Iraq (RM267.0 million).

Comparatively, a total of 64 foreign contractors from 12 countries secured 129 construction projects in Malaysia worth RM12.3 billion (2011: 118 projects, RM18.1 billion). Contractors from Japan (22 contractors, 39 projects) and Singapore (12 contractors, 26 projects) are the most involved. Among the largest construction projects awarded to foreign contractors in 2012 are 1000mw Coal Power Plant Project at Tanjung Bin, Johor (RM4.8 billion) awarded to Switzerland contractor and Klang Valley MRT: Electric Train System Works at Kuala Lumpur (RM1.4 billion) awarded to German contractor.

Table 3.11 Value and Number of Export of Construction Services

Value (RM million)				
Sector and Type of Project	**2010**	**2011**	**2012**	**1H 2013**
Total Private Sector	**3,879.1**	**8,536.2**	**1,644.0**	**1,525.0**
Residential	3,304.1	86.5	-	1,035.0
Non-Residential	100.4	-	215.0	165.0
Social Amenity	-	-	-	-
Infrastructure	474.6	8,449.7	1,429.0	325.0

Number				
Sector and Type of Project	**2010**	**2011**	**2012**	**1H 2013**
Total Private Sector	**23**	**9**	**5**	**4**
Residential	7	2	-	1
Non-Residential	7	-	2	2
Social Amenity	-	-	-	-
Infrastructure	9	7	3	1

*As at 30 June 2013

Source: CIDB Malaysia

Table 3.12 Value and Number of Import of Construction Services

Value (RM million)				
Sector and Type of Project	**2010**	**2011**	**2012**	**1H 2013**
Total Private Sector	**10,557.4**	**16,446.3**	**12,159.4**	**7,166.5**
Residential	838.4	701.6	451.6	35.2
Non-Residential	6,189.9	7,759.4	4,822.5	6,344.6
Social Amenity	0.7	9.3	3.0	1.2
Infrastructure	3,528.4	7,976.1	6,882.3	785.5
Total Public Sector	**316.2**	**1,610.7**	**144.9**	**0.0**
Residential	-	-	-	-
Non-Residential	-	-	144.9	-
Social Amenity	-	-	-	-
Infrastructure	316.2	1,610.7	-	-
Grand Total	**10,873.6**	**18,057.1**	**12,304.4**	**7,166.5**

Number				
Sector and Type of Project	**2010**	**2011**	**2012**	**1H 2013**
Total Private Sector	**109**	**118**	**129**	**19**
Residential	8	7	13	2
Non-Residential	81	88	92	12
Social Amenity	1	3	2	1
Infrastructure	19	20	21	4
Total Public Sector	**1**	**6**	**1**	**0**
Residential	-	-	-	-
Non-Residential	-	-	1	-
Social Amenity	-	-	-	-
Infrastructure	1	6	-	-
Grand Total	**110**	**124**	**129**	**19**

*As at 30 June 2013
Source: CIDB Malaysia

Table 3.13 5 Major Project Secured by Malaysian Contractors in Foreign Market in 2012

	Country	Type of Project	Value (RM million)
1.	Oman	Infrastructure	1,004.0
2.	Iraq	Infrastructure	267.0
3.	Saudi Arabia	Infrastructure	158.0
4.	Qatar	Non-residential	134.0
5.	Qatar	Non-residential	81.0

*As at 30 June 2012
Source: CIDB Malaysia

Table 3.14 5 Major Projects Secured by Foreign Contractors in Malaysia in 2012

Country		Type of Project	Value (RM million)
1.	Switzerland	Infrastructure	4,768.3
2.	German	Infrastructure	1,365.1
3.	German	Non-residential	936.3
4.	Korea	Non-residential	555.9
5.	Korea	Non-residential	538.5

*As at 30 June 2013
Source: CIDB Malaysia

3.7. Construction Industry Outlook for 2013 / 2014

In 2013, the Malaysian economy is expected to grow moderately by 4.5 - 5.0%. Under the 2014 Budget, the government has targeted the construction sector to grow by 10.6% in 2013 and 9.6% in 2014. The 10th Malaysia Plan 2011-2015 (10MP) targeted Malaysian economic to grow by 6.0 % and the construction sector at 3.7% in 2014.

Construction sector prospects for 2013 and 2014 is promising which is driven from the implementation of projects under EPP, 10MP, Government Transformation Programme (GTP) and EPP regional economic corridors and also from the demand of residential sector. Since the formulation of ETP in 2010, construction projects value continue to increase each year from RM90.9 billion in 2010 to RM118.9 billion in 2012. The construction sector seems to have not been affected by the weakening global environment but showing a sustainable and dynamic domestic economy. The success of ETP came from the government support and private sector collaboration. Private sector has begun to experience transformational role in generating economic growth when the private sector increased their function significantly. Malaysian Government is expected to continue in adopting business-friendly policies by supporting accommodative incentives and will keep on improving the welfare of the people in line with the philosophy of 'no party will be marginalised from the mainstream of development'. The main factors to boost construction demand will remain strong at least by the year 2020. Public mega project is still in its initial stage, FDI investment is expected to continue growing, export demand is forecasted to recover and household income which continues to increase will provide a solid foundation for the Malaysian economy to continue its growth and give good prospects for the construction sector.

Projections made by CIDB are based on rough prediction, limited source and information from mainstream and economic reports from various parties and CIDB's experience. With the implementation of the EPP, GTP, 10MP and EPP regional economic corridor, value of construction projects for 2013 is expected to be at RM110.0 billion and in 2014, the value will reach RM115.0 billion. The contribution of government projects in 2013 is estimated at 14.3% and 15.4 % in 2014. In 2014, it is predicted that the world economy will recover which encourages trade and investment will continue to grow. Furthermore, Malaysian economy has opened up vast domestic market either through free trade agreement (FTA) or more domestic economic sector to be liberalised.

PERFORMANCE MANAGEMENT AND DELIVERY UNIT, PRIME MINISTER'S OFFICE

Greater Kuala Lumpur/Klang Valley – The Spillover Benefits to the Economy

Dato' Ahmad Suhaili Idrus

Director of Greater KL/KV and UPT

JABATAN PERDANA MENTERI

PEMANDU

PERFORMANCE MANAGEMENT AND DELIVERY UNIT

Table of Contents

1. BACKGROUND TO ETP AND NKEA

On 10th June 2010, the Prime Minister of Malaysia, Dato' Sri Najib Tun Razak unveiled the Tenth Malaysian Plan. This comprehensive blueprint charts the development of government reformations and the ambitious New Economic Model for the next five years. The Plan contains new policy directions, strategies and programmes aimed at delivering the desired outcomes for all Malaysians.

The Tenth Malaysian Plan resulted in the birth of the Government Transformation Programme (GTP) on 28th January 2010, to address government transformation in seven key areas which were the highest concerns of Malaysian citizens through surveys - Fighting Corruption, Reducing Crime, Reducing Poverty, Improving Access to Education, Improving Rural Basic Infrastructure, Improving Urban Public Transport and Improve Cost of Living.

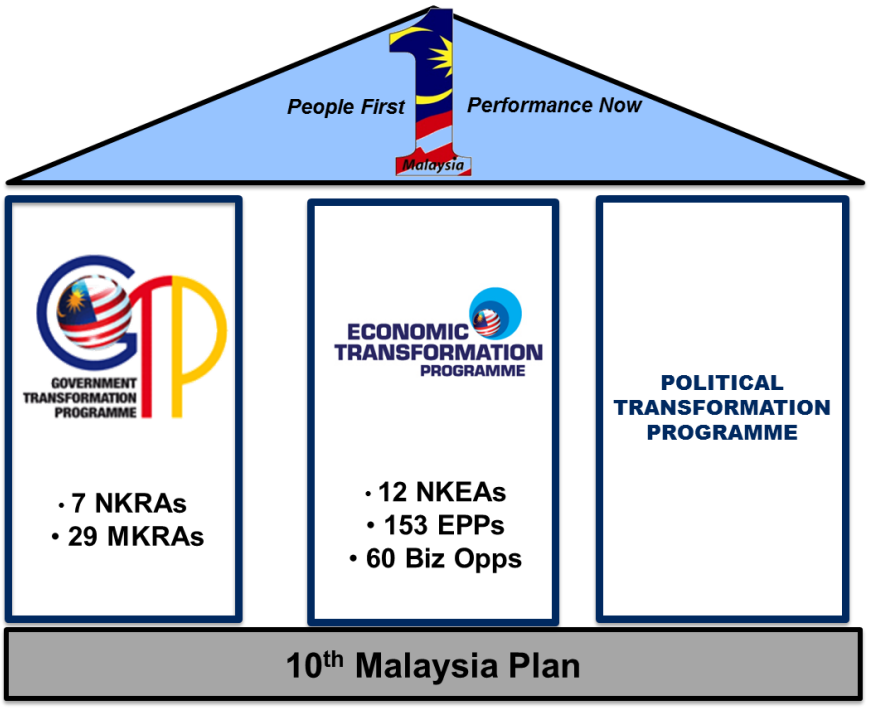


Figure 1. Formation of GTP and ETP under 10th Malaysia Plan

Six months after launching the GTP, came the Economic Transformation Programme (ETP). It is a comprehensive plan to propel Malaysia's economy into a high income economy. ETP aims to lift Malaysia's Gross National Income (GNI) to US$523 billion by 2020, and raise GNI per capita from US$6,700 to US$15,000, meeting the World Bank's threshold for a high income nation. It was expected that 92% of the total ETP investment would originate from private sectors in Malaysia's top 11 National Key Economic Areas (NKEA) – Wholesale and Retail, Oil and Gas, Electrical & Electronics, Tourism, Education, Healthcare, Palm Oil and Rubber, Financial Services, Communication Contents and Infrastructure, Business Services and Agriculture.

The twelfth NKEA, which is the Greater Kuala Lumpur/Klang Valley (GKL/KL) came about when there was an apparent need to drive urbanization. As seen in countries like China, Japan, Italy, US and UK, urbanization drives economic growth. As competition among cities is becoming more intense, it is vital for the government to improve the capital Kuala Lumpur competitiveness and liveability aspects viz. infrastructure, healthcare, education, cultural and safety so that it will continue to attract business, investment and visitors in the future.

For the purpose of conference topic, this paper will focus on the activities within NKEA GKL/KV of the Economic Transformation Programme.

2. IMPLEMENTATION OF EPPs UNDER NKEA GKL/KV

When the ETP was first launched, it had 131 Entry Point Projects (EPPs) from the twelve NKEAs, which later expanded to 153 EPPs in 2012. They are called EPPs because these projects are catalytic with set objectives to deliver investment, jobs and GNI. These are high impact projects, matched with specific ideas and actions, to spur growth of the NKEAs. Some involve large infrastructure investments while others have a more direct effect on the output of their sectors and on the life of Malaysians.

GKL/KV's aspiration is to be one of the top economic and most liveable cities in the world by 2020. Hence, all the efforts on the EPPs are focused into 4 categories of initiatives to achieve the twin aspirations:

Category	Description
Magnet	• Make Kuala Lumpur the hub for multinational companies (MNCs) • Attracting the best and brightest talents within and out of Malaysia
Connect	• Enhance connectivity to regional and global economic hub. • Enhance public transport to achieve 40% modal share by 2020
New Places	• Urban renewal in targeted locations to enhance value of real estate and improve liveability among city dwellers • Increase shaded areas and public parks • Improve connectivity along heritage trails and build iconic infrastructure
Enhanced Services	• Create easy pedestrian access throughout the city • Ensure effective use of resources such as energy, water and land

Table 1. Four categories under NKEA GKL/KV

There are 9 EPPs which are directly addressing the categories above. The combined 9 EPPs are expected to generate RM 190 billion of incremental GNI and facilitate population growth from 6 million to 10 million by 2020.

i. Rationale for Development (or EPP)

Based on the 4 categories, EPPs were carefully selected and deliberated based on GNI impact, jobs creation and investment. Table 2 explains detailed rationale of each EPP under NKEA GKL/KV.

EPP	Description	Owner	Rationale
EPP #1	Attract 100 world's top MNCs	Invest KL	• Bring 100 MNCs by 2020 • Promote GKL/KV as an investment destination • Proactively reach out to target companies to create awareness of opportunities • Provide one-stop relocation service • Conduct effective post investment management to retain and help MNCs
EPP #2	Attract high-skilled immigration	Talent Corp	• Create large number of jobs, and building local "eco-system" • Development of detailed talent attraction program • Attracting qualified and skilled Malaysians living abroad • Retaining foreign talents.
EPP #3	Connect to Singapore with High Speed Rail	SPAD	• Connecting SEA's two largest economic agglomerations • Stimulating growth in intermediate Malaysian cities • KL CBD to Singapore CBD connection in 90 minutes
EPP #4	Mass Rapid Transit: An integrated urban rail system	SPAD	• Backbone of rail transportation system for GKL/KV • Unlocking development value of spaces • Unleashing productivity of workers
EPP #5	River of Life	JPS & DBKL	• Revitalise the Klang and Gombak rivers into an economic engine • Heritage and cultural heart of *1Malaysia* • Catalyst to enhance liveability in the heart of Greater KL
EPP #6	Create a greener KL	DBKL	• Achieving $14m^2$ green space per person to achieve a top-20 ranking in liveable city indices
EPP #7	Establish iconic places	DBKL	• Creating unique and iconic attractions in the city to increase level of community interest and touristic economic activities. • Identify and leverage existing landmarks to enhance KL's distinct identity and heritage.
EPP #8	Pedestrian Network	DBKL	• Integrate major developments in KL such as MRT and River Of Life • Improve connectivity within CBD for pedestrians
EPP #9	Solid waste management	JPSPN	• Prolonging and reducing usage of sanitary landfills • Increase recycling rate • Facilitating a proper system for construction and demolition waste disposal

Table 2. Rational of each EPP under GKL/KV

iii. Area Covered by Development Projects

Greater Kuala Lumpur and Klang Valley is a regional conurbation comprising two Federal Territories and eight municipalities. Figure 2 is an illustration of the boundaries of NKEA GKL/KV, which starts from city centre of Kuala Lumpur and across 9 other local authorities.

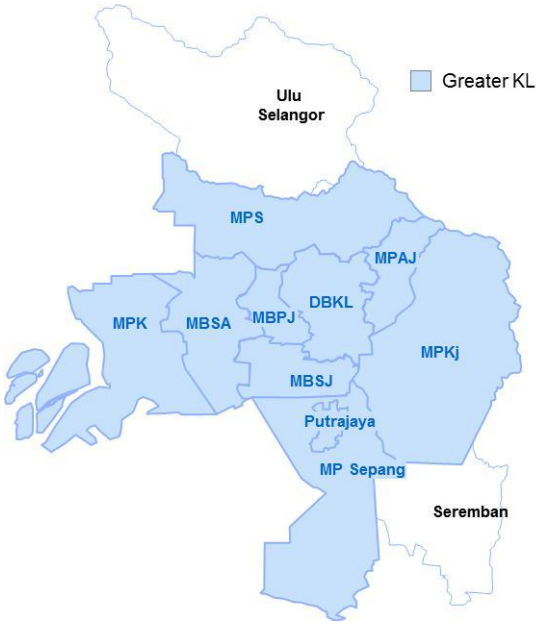


Figure 2. Boundaries of GKL/KV

These areas were selected with the following criteria:

a. Focus on highest density and highest GNI contributing areas
    i. Kuala Lumpur city centre
    ii. Administrative capital in Putrajaya
    iii. Main concentrations of commercial and industrial clusters in Selangor
b. Adheres to traditional jurisdictional boundaries for ease of administrative oversight and implementation coordination
c. High branding value by focusing on a narrower geographical scope (i.e. scarcity value)
d. Includes major connectivity hubs to link Greater KL to the world (e.g. KLIA)

Amongst all the NKEA GKL/KV projects, EPP#3 – High Speed Rail will be the only project which stretches beyond GKL/KV boundary. Starting from Kuala Lumpur city centre, the High Speed Rail track cuts across Selangor state to Seremban (Negeri Sembilan). From there, it will continue south bound to Ayer Keroh (Melaka), Muar, Batu Pahat and Iskandar Region in Johor. Finally, the track will cross international boundary into the Singapore CBD. The project encompasses four Malaysian states as well as Singapore.

Figure 3. Proposed High Speed Rail Alignment across 4 States and Singapore

iv. Cost of Development Projects

EPP	Development Costs
1	Operational Expense at US$5 mil/year
2	Operational Expense at US$3 mil/year
3	Estimated cost - US$ 13.3b
4	Estimated cost - US$ 10b for Line 1
5	Estimated cost- US$ 1.4b
6	Estimated cost- US$ 6.3m
7	Estimated cost - US$ 75m
8	Estimated cost- US$ 19m
9	Not more than US$ 5m

Table 3. Development Cost of 9 EPPs

vi. Project Development and Milestones

Figure 4 depicts overall target of all the EPPs under NKEA GKL/KV by 2020. Also, up to date achievement from each EPP ranging from civil activities to trees planting and from secured MNCs to relocation of talents outside Malaysia. Please check Greener KL 300,000 trees (or 100,000 trees) ?

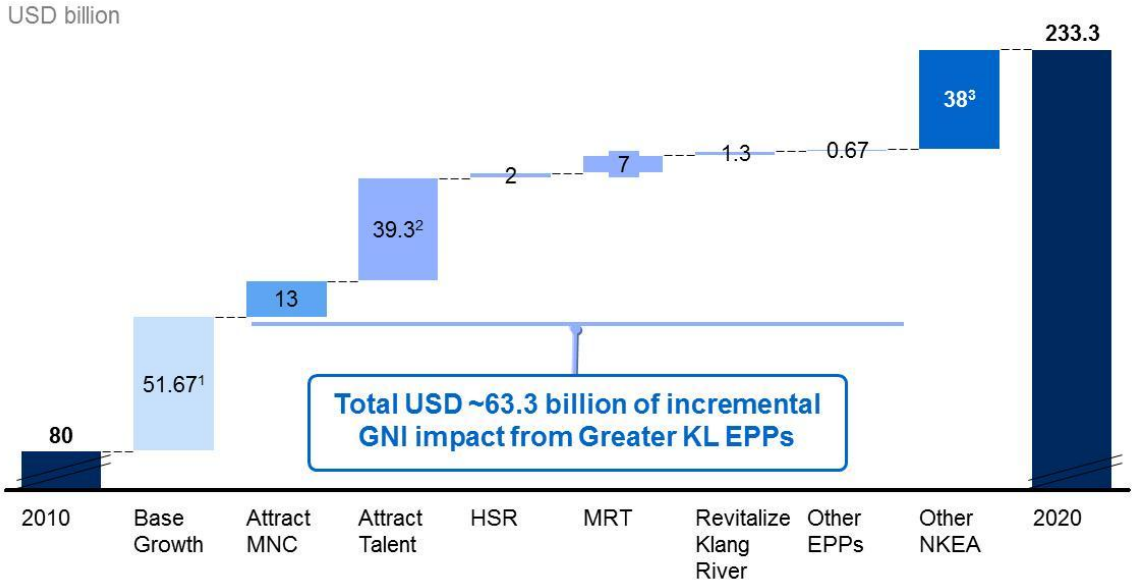
	Achievements/Milestones	2020 Target
MNC Attractions	▪ Secured 26 MNCs located in GKL/KV from 2011 - 2013	▪ 100 MNCs or more ▪ GKL/KV as an investment destination
Talent Attractions	▪ 1,971 persons have been relocated o Malaysia under TalentCorp's programmes in 2012	▪ Create large number of jobs, and building local "eco-system" ▪ Target 500,000 through the attraction of foreign talent (overseas Malaysians or expatriates)
Mass Rapid Transit	▪ Elevated works progressing on schedule ▪ All 10 TBMs are in Malaysia	▪ Develop an integrated urban rail system GKL/KV
High Speed Rail	▪ Completed Phase 1A and 1B ▪ Commencing Phase 2A with G-to-G agreement	▪ Operational of Malaysia's first High Speed Rail from KL-SG ▪ Connecting SEA's two largest economic agglomerations
River of Life	▪ Cleaning the river is on going ▪ Beautification work in two phases started in 2012	▪ Revitalise the Klang river into an economic engine ▪ Water quality Class IIb
Greener KL	▪ Approximately 300,000 trees planted by DBKL ▪ On going effort in obtaining private sector support	▪ Achieving 14m2 green space per person to achieve a top-20 ranking in liveable city indices
Iconic Places	▪ Green Icon, TAR Heritage Park completed in 2012 ▪ Restoration and upgrading of Medan Pasar and Masjid Jamek completed in 2013	▪ Create unique and iconic attractions in the city to increase level of community interest and touristic economic activities
Pedestrian Network	▪ Upgraded 42km of uncovered pedestrian walkways.	▪ Providing comfortable pedestrian walkways to integrate major developments in KL such as MRT and River Of Life
Solid Waste Management System	▪ Setting up construction waste facility ▪ Setting up Anaerobic Digestion facility	▪ A proper system for construction and demolition waste disposal to be in place ▪ Increase recycling rate

Figure 4. Milestones and Targets of NKEA GKL/KV EPPs

4. IMPACT TO THE ECONOMY

i. GNI Contribution

Collectively, initiatives under NKEA GKL/KV are projected to propel GNI contributions of US$ 63.6 billion. This will be achieved by the contribution of EPP#1 (MNC Attraction), EPP#2 (Talent Attraction), EPP#3 (High Speed Rail), EPP#4 (Mass Rapid Transit), EPP#5 (River Of Live) and other smaller contribution by other EPPs as shown in Figure 5 below.



1 Assume base GNI per capita of US$ 13,333 in 2010, annual GNI growth rate of 4.5%, and average population of seven mln
2 Double counts with labour components of all other Greater KL initiative across all NKEAs
3 Other NKEA GNI impact (including EPPs, Business opportunities and multiplier impacts) that directly contributes to Greater KL's GNI
SOURCE: Lab analysis

Figure 5. NKEA GKL/KV GNI Contributions

Along with the base growth and GNI contributions from other NKEAs (ie. Healthcare, Tourism, Wholesale & Retail and etc), it is projected that Greater Kuala Lumpur area will have a total GNI value of US$ 233.3 billion by 2020. GNI contributions NKEA GKL/KV EPPs will come in various forms such as construction from infrastructures, creating jobs opportunities, foreign investments, increment of property values and time savings from improved productivity.

ii. Property Development

As NKEA GKL/KV strives towards in achieving its twin aspirations of being one of the world's top economic and liveable cities, the following three scenarios are expected to materialize:

1. Population in GKL is expected to increase to 10 million due to business growth, economic expansion and jobs creation. This will result in high growth in property development with the demand of all kinds on projects such as residential building, office blocks, commercial hubs and industrial parks.
2. Increment of property prices due to higher land value from improving liveability. Contributing factors are from better public transportation system, more greener areas and enhanced basic services like water, sewerage, drainage and solid waste.
3. High impact projects like the Mass Rapid Transit, River of Life and other infrastructure projects over a long period will continue to drive the market.

An eminent example of the mentioned property impact can be seen in Figure 6. The property market along MRT Line 1 alignment has seen increment of per square foot prices since the launching of the project. It is expected that it will increase minimally at 40% and as high as 58% once the project is completed in 2016.

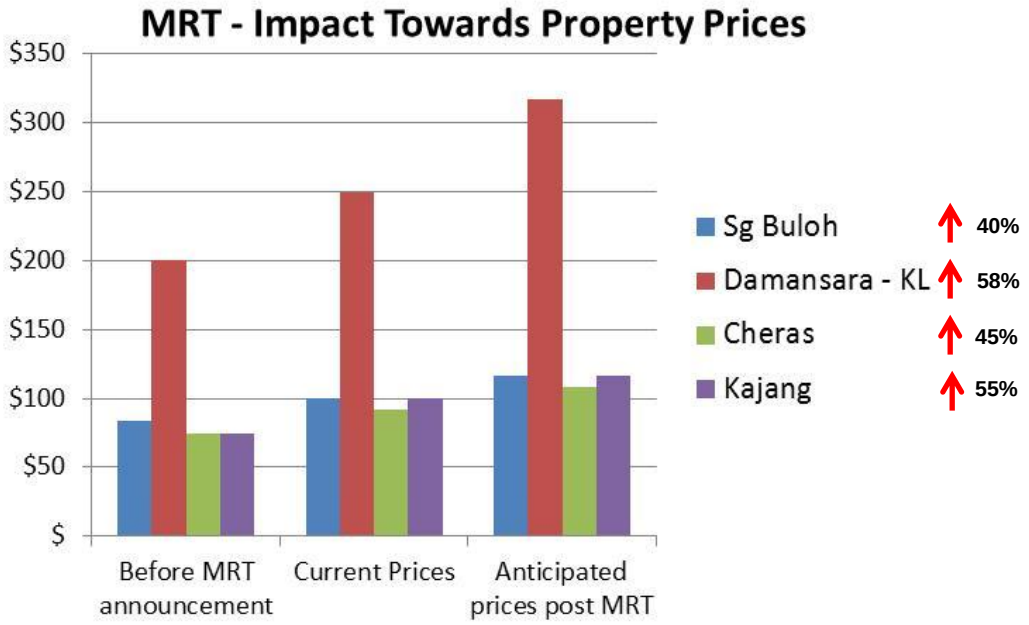


Figure 6. Impact of Property Prices by MRT (Price Per Square Foot)

NKEA GKL/KV initiatives will enable a comprehensive development plan for around Kuala Lumpur and Klang Valley area instead of ad hoc planning that allows developers to just add on in a piecemeal fashion. GKL/KV will be a better planned metropolis with the larger suburban serving the needs of the city centre.

Regeneration of old areas, improvement of existing critical locations and urban renewal initiatives will increase the development value, while at the same time ensuring the newly redeveloped areas blend in with the existing landscape.

A proper comprehensive plan will have to take into consideration of various factors including population growth, job creation (ie. industrial and commercial), transportation requirement, utilities, drainage and recreational parks.

iii. Jobs Creation

Meanwhile, the EPPs under NKEA GKL/KV are expected to create more than 300,000 jobs by year 2020 as shown in Figure 7. InvestKL, the implementing agency under EPP#1 is mandated to market GKL to world's top MNCs to set regional headquarters. This EPP will contribute most of the job opportunities for a sustainable timeframe. The next set of job creation comes from infrastructure and civil related projects such as High Speed Rail, Mass Rapid Transit and River of Life.

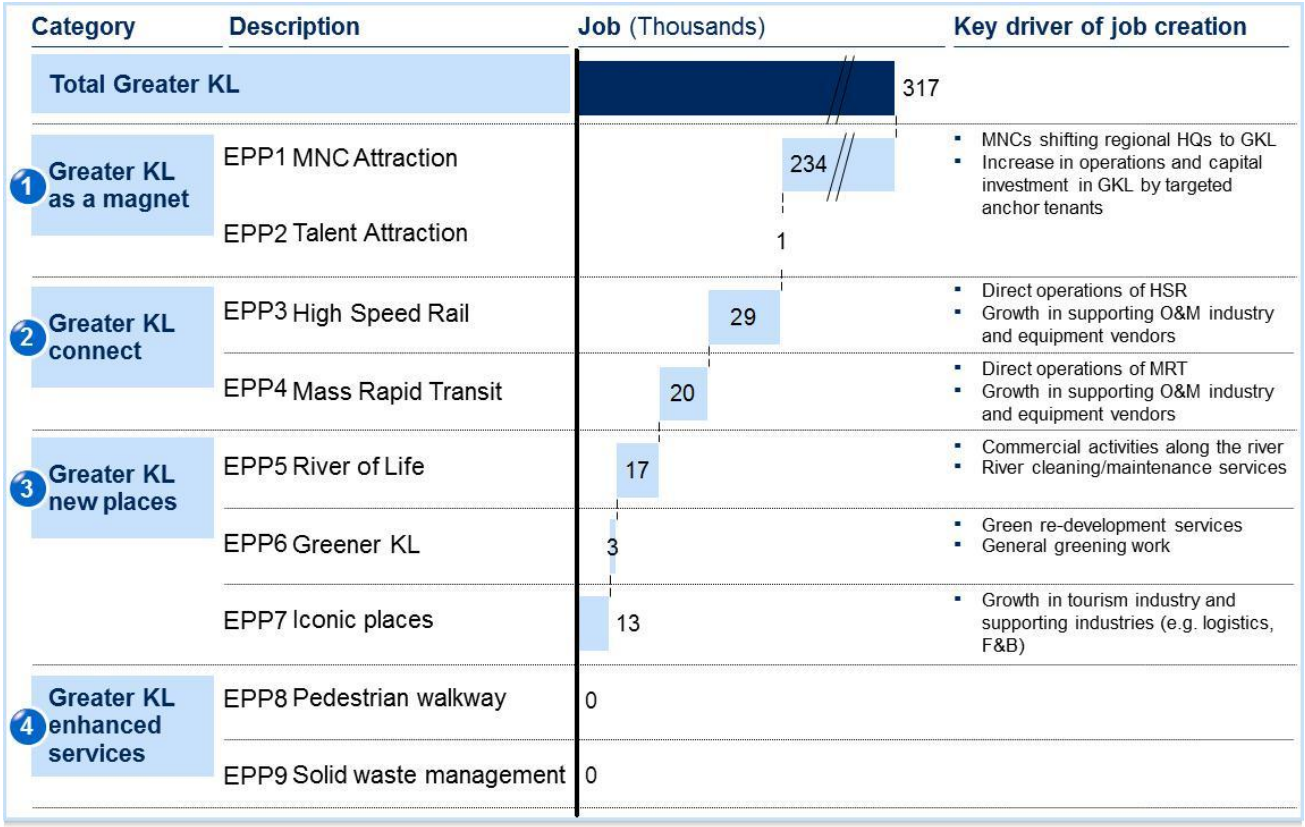


Figure 7. Estimated Jobs Contribution from EPPs

4. ISSUES AND CHALLENGES IN IMPLEMENTATION AND MITIGATION

The issues related to NKEA GKL/KV EPPs can be grouped into two major categories. The physical and structural issues are more towards construction related problems such as land acquisition, uncharted utilities and so on. While the civil and social issues are leaning towards human related factors. Table 4 and Table 5 in the following sections will detail out the related issues and some of the mitigation done to address them.

i. Physical and Structural

Issues	EPP Projects	Mitigation
1. Land acquisition across two local authorities	MRT, River of Life	Mutual agreement, public outreach and communication initiatives need to be carried out to acquire land where projects are developed.
2. Squatters relocation along affected project area	River of Life & Iconic Places	Illegal occupying on project site, thus delaying construction works. Community outreach/assist in relocation exercise to address this
3. Difficult/unexpected ground/soil conditions	MRT	Detailed geophysical and borehole investigation is being undertaken and appropriate ground treatment will be placed. The Variable Density Tunnel Boring Machine (first in the world) will be converted from slurry mode to Earth Pressure Balance mode at the appropriate location.
4. Presence of underground utilities which are not mapped out especially in 'older' areas	MRT, Iconic Places & River of Life	Carry out detailed underground utility location/detection. Relocation of existing utilities (if necessary). Map out new corridor for proposed utilities including electronic marking of utility
5. Limited knowledge of technology to be used in new mega projects	MRT & High Speed Rail	Engage with consultants and continuous efforts in reviewing case studies and experience of other countries
6. Traffic congestion – Construction works causing narrowing of busy roads	MRT	Active notification to the public through media and public engagement by project implementers

Table 4. EPPs Physical and structural issues

iii. Civil and Social

Issues	EPP Projects	Mitigation
1. Managing public perception, communication and buy-in as public is more educated and more vocal	MRT, High Speed Rail, River of Life, Iconic Places	Educate on social economic impact, jobs creation, improving connectivity and increasing KL's competitiveness
2. Managing multi-disciplinary projects which require extensive inter-agency coordination and cooperation	MRT, River of Life, Iconic Places	Provide a governance structure which can track and monitor progress. Identify gaps and provide solution to issues and conflicts
3. Lack of specific talent required by MNCs to operate Regional HQ in Kuala Lumpur	MNC & Talent Attraction	Collaboration between Invest KL and Talent Corp to establish a program to create talent with "specialized" skills for new services industries and traditional "commoditized" skills (eg. O&G industry)
4. Lack of support towards investors in service based industries	MNC Attraction	Provide comprehensive "hand-holding" for investors. Some of the activities involved are workshops and labs between investors, regulator, stakeholders, local partners and authorities to identify gaps
5. Limited knowledge of **High Speed Rail** technology	High Speed Rail	SPAD engaged with consultants and continuous efforts in reviewing case studies and experience of other countries with operational HSR network. This process will educate SPAD about emerging HSR technologies to identify suitability and assimilate for Malaysian purpose
6. Maximizing the value of land to recoup government investment	High Speed Rail, MRT & River of Life	Economic Impact Study is being undertaken to determine best use and highest return of gazetted land

Table 5. EPPs Civil and social issues

5. CONCLUSION

Since the inception of Government Transformation Programme (GTP) and Economic Transformation Programme (ETP), Malaysia has been progressing steadily to achieve the targeted high income nation by 2020. One of the National Key Economic Area (NKEA) driving towards that target is the Greater Kuala Lumpur/Klang Valley (GKL/KV). The carefully chosen nine Entry Point Projects (EPPs) are expected to drive urbanization of GKL/KV to become one of the world's top economic and most liveable cities. These EPPs are projected to bring in GNI of US$ 63.3 billion, while creating over 300,000 jobs. In parallel, residents of GKL/KV are expected to experience increment of property values, improved connectivity, enhanced services, more greener spaces and emerging of brighter talents.

CONSTRUCTION FOR DISASTER REDUCTION –

FLOOD MANAGEMENT IN MALAYSIA

Abstract:

Malaysia's main natural disaster is floods that occur annually to varying degrees of severity. The trend of major floods has shown a rise in frequency corresponding to the economic development and urbanisation of the country. After 1971, the government created proper machinery for flood response beginning with the formation of a Permanent Committee on Flood Control. Early actions include the commissioning of flood mitigation studies and implementation of engineering projects. Expenditure for flood mitigation has grown from RM14 million in 1971-1975 to RM5.2 billion in 2005-2010 exponentially. After 2000, significant changes were made as the government adopted Integrated Flood Management (IFM) as its underpinning strategy to mitigate floods. Under IFM, the emphasis is on addressing issues at the river basin level and involves participatory approach requiring public awareness to be raised and for the general populace to 'live and adapt' to floods.The introduction of the Urban Stormwater Management Manual for Malaysia as a guide for developers is a major component of the IFM strategy. Flood problems are hence solved holistically using a combination of structural and non-structural methods. While structural solutions are still key to solving chronic flood problems especially in the wake of climate change, their design can be optimised by non-structural means. Implementation of IFM is key towards reducing the nation's risk to disaster.

Introduction

Based on a history of causing the greatest economic damage, floods are Malaysia's biggest threat. In the last three decades, expenditure for flood mitigation has more than tripled from a mere RM14 million in the period 1971-1975 to RM5.3 billion in 2000-2005. From 2000 onwards, the government has actively promoted Integrated Flood Management in addressing flood-related disasters. Hence, from a purely structural approach, flood management in Malaysia has shifted towards a holistic approach where non-structural measures have been given equal emphasis. While the government continues in its traditional role as provider of structural solutions, flood mitigation is to be a collective and participatory approach with responsibilities shared by all stakeholders. This paper presents Malaysia's approach to flood management and how it has made the paradigm shift from the traditional curative approach to a more proactive and preventive one.

Climate

Annually, Malaysia gets most of her rain during the north-east and south-west monsoons. The north-east monsoon occurs from November to March and brings heavy rain spells to the east coast of peninsular Malaysia, north-eastern Sabah and western Sarawak. The south-west monsoon blows in from May till September and affects the west coast of the peninsular. Rainfall distribution in the south-west coastal areas is affected by squalls originating from Sumatera that contribute much rain. During the inter-monsoon period from September to November, cities in the west coast of Peninsular Malaysia are frequently affected by convectional thunderstorms.

The annual average rainfall is 2420 mm for Peninsular Malaysia, 2630 mm for Sabah and 3830 mm for Sarawak. Precipitation is recorded to be heavier in the east coast of Peninsular Malaysia and the coastal regions of Sabah and Sarawak. In extreme situations, 600 mm rainfall has been recorded in 1 hour and 100 to 200 mm of rainfall in 1 to 2 hours.

Flood in Malaysia

Definition and Types of floods

Floods occur whenever the capacity of the natural or man-made drainage system is unable to cope with the volume of water generated by rainfall. Resultant run-offs from rainfall over a catchment flow through ditches and channels to the river. If the rainfall duration is prolonged, the flow and water level in the river increases until it reaches a point beyond the capacity of the river channel to contain. The waters then overflows the banks and into the flood plain. In extreme cases, even the flood plain capacity is exceeded and river waters flood the adjacent land.

For management purposes, floods in Malaysia fall under two general types namely monsoonal floods and flash floods. Monsoonal floods occur as a result of rivers overflowing their banks following long duration rainfalls associated with monsoon periods. A flash flood is the type that occurs after a short duration, high intensity rainfall over a relatively small area. In major cities, flash floods can occur after one to three hours of rain and subside in less than six hours. Flash floods while prone to urbanised areas can actually occur in any low lying area especially those with bowl-shaped topography. It is often called 'nuisance' flood as it occurs almost without warning, disrupts economic activities and results in massive traffic jams in the city.

Flood History and Records

The first notable flood event in Malaysia's history was one that occured in the east coast (Peninsular Malaysia) state of Kelantan in 1886. This was followed by the flood of 1926 nicknamed the 'red flood' due to the reddish colour of sediment characterising the flood. In 1967, major floods raked havoc across the basins of three major rivers (Kelantan, Terengganu and Perak River) claiming 55 lives. This was surpassed by the great flood of 1971 that affected nearly all states throughout the country with Pahang taking the most damages. This flood caused 25 deaths and

particularly, was the worst experienced in the center of the Federal capital of Kuala Lumpur.

Period	Year of Flood Occurrence
1920-1930	1926
1930-1960	1949
1970-198	1971
1980's	1982, 1986, 1988
1990's	1993, 1995, 1996, 1997
2000 to date	2000, 2001 (twice), 2002, 2003, 2004, 2006, 2007 (twice)

Table 1: Major flood Incidents in Malaysia

From the record of major flood incidents (Table 1), a rise in frequency of events can be observed beginning in the 1980's, which coincided with the period of rapid economic development, and urbanisation in Malaysia. The past two decades have seen the increase in frequency of serious floods in major cities such as Kuala Lumpur, Penang and Kuching (Sarawak). From 2005 to 2009, thirty five (35) cases of serious flooding have been recorded. The worst amongst these were the Johor floods of 2006 which was the most devastating in recent history. The Johor floods were attributed to incessant rainfall over a period of 4 days from 18 to 21 December 2006 affecting the entire state (JPS, 2007).

Flood Areas

A total of 29,799 square kilometers equivalent to 9% of Malaysia's total land area is considered flood prone (Figures 1 and 2). It affects 4.819 million people or 22.2% of the total population. These figures have risen from 1982 where the flood areas covered 29,021 square kilometers and affected 2.736 million people. Despite the increase in area, not every region is affected by floods each year.

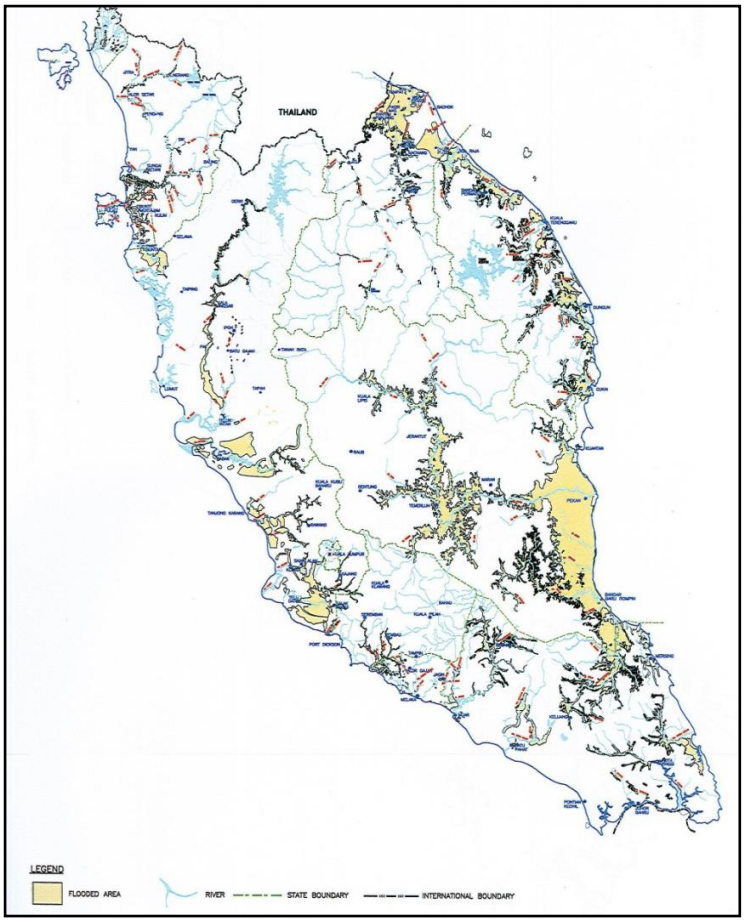


Figure 1: Flood Prone Areas Peninsular Malaysia

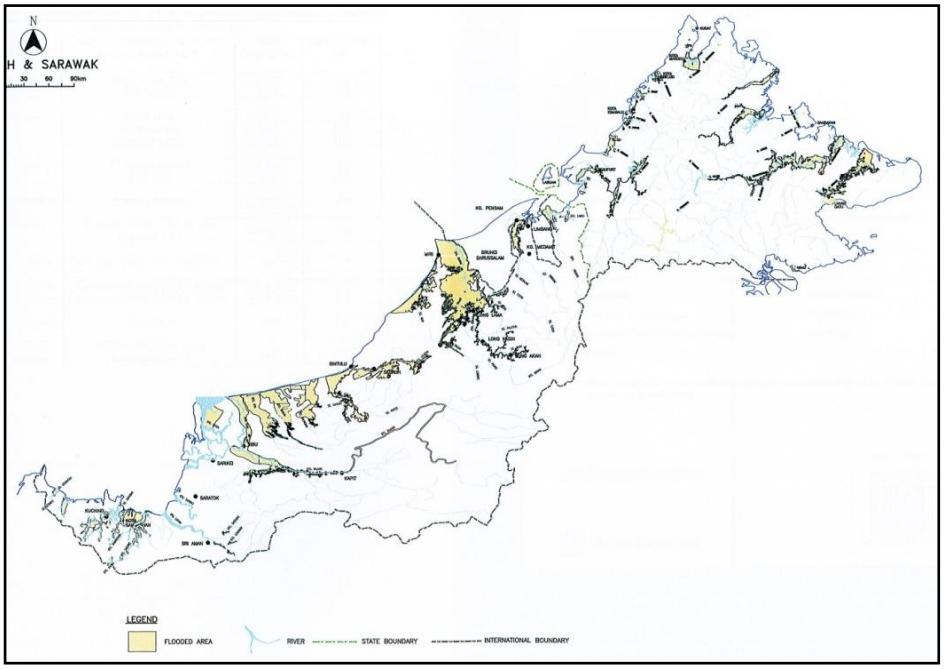


Figure 2: Flood Prone Areas - Sabah and Sarawak

Causes

Extreme rainfall events are capable of creating excessive surface run-off beyond the design capacity of existing drainage systems. Floods occur when flows in drainage

channels and rivers exceed their conveyance capacity. The increasing run-off trend due to urbanisation has been evident based on a study of the mean flows in the Klang River in Kuala Lumpur. From 1910 to early 1980s, the mean annual flood flow was 148 cubic meters per second. In 1988, this flow increased three times to 440 cubic meters per second (Roseli, 1999). The main causes of flooding in Malaysia is summarised below:

i. increased run-off rates due to the urbanisation;
ii. loss of flood storage as a result of development extending into and taking over flood plains and drainage corridors;
iii. inadequate drainage systems or failure of localised drainage improvement works extended insufficiently downstream;
iv. constriction at bridges and culverts that are either undersized or partially blocked by debris buildup or from other causes;
v. siltation in waterway channels from indiscriminate land clearing operations;
vi. localised continuous heavy rainfall;
vii. tidal backwater effect;
viii. inadequate river capacity

The rising trend of flash flood events point to the fact that the rate of urbanisation has far exceeded our capacity to install flood mitigation measures. Climate change has been studied since 2000 and a growing frequency of high intensity rainfall events have been observed particularly in Kuala Lumpur.

Flood Damage

The 2006 Johor floods was estimated to cost RM1.5 billion in damages while floods in Kuala Lumpur city center has been estimated at RM112 million per year. The assessment of flood damage helps identify, predict and evaluate the benefits of flood control projects. Understanding the probabilities of damage and costs leads to better planning of the flood mitigation measures to undertake.

Damage due to floods is estimated based on tangible and intangible damage. Tangible damage can be a direct monetary value of properties, assets and inventories destroyed, the cost of repair and restoration. The indirect value of tangible damage is defined as loss of wages, projected sales and property value. The intangibles may include environment degradation, increase in cases of illness and weakening of social cohesion. If the damage associated with various annual events is plotted against their probability of occurrence, the average annual damage (AAD) is equal to the area under the consequence/probability curve. The AAD provides a basis for comparing the economic effectiveness of different management measures, i.e. their ability to reduce the AAD. Both actual and potential damages (related to a design flood scenario) are assessed to determine the AAD. The practise in Malaysia is to use both Rapid Assessment and Detailed Assessment methods depending on the availability of data.

Projects Implementation History

Urban areas were not the only ones which benefited from flood mitigation projects. To protect valuable agricultural land, projects were also implemented in fast growing agricultural areas such as the Integrated Agricultural Development Project (IADP) areas namely Perlis IADP, Western Johor IADP, Ketara IADP, Kemasin Semarak IADP and Samarahan IADP. Under the 2nd Malaysia Plan[1] (1971-1975), a sum of only RM14 million was spent for flood mitigation projects. This was followed by the 3rd Malaysia Plan (1976-1980) with an expenditure of RM56 million, the 4th Malaysia Plan (1981-1985) with RM141 million, the 5th Malaysia Plan (1986-1990) with RM155 million, the 6th Malaysia Plan (1991-1995) with RM431 million, the 7th Malaysia Plan (1996-2000) with RM845 million. The 8th (2001-2005) and 9th Malaysia Plans (2005-2010) were allocated RM2.7 billion and RM5.264 billion respectively.

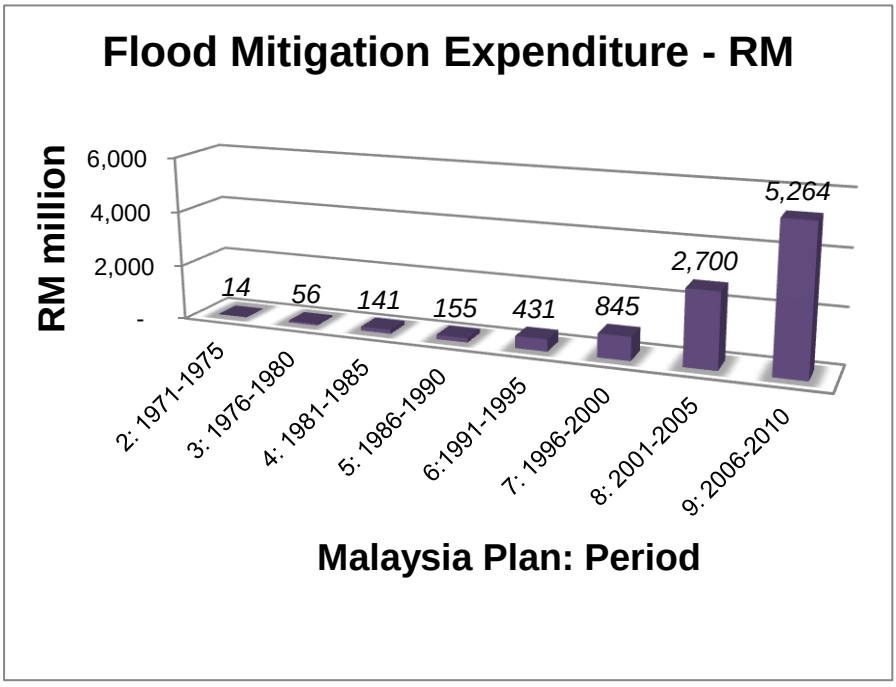


Figure 3: Flood Mitigation Expenditure 1971-2010

Flood Mitigation and Related Studies

Since 1972, a number of river basin studies have been carried out for rivers where major flood problems exist. The objective of these studies is to draw up master plans for water resources development and measures for flood mitigation form an important component. To date, more than 26 river basin studies have been completed, including Kuala Lumpur (1974 & 2002), Pahang River (1974), Kelantan River (1978 & 1989), Terengganu River (1978), Limbang River (1978), Kinabatangan River (1982), Samarahan River (1983), Batu Pahat River (1984), Johor River (1985), Golok River (1985), Besut River (1988), Klang River (1978,1989 & 1994), Menggatal, Sabah (1999), Miri Flood Diversion (2000), Linggi (2000), Selangor River (2000), and Bernam River (2001).

[1] The 1st Malaysia Plan (1966 to 1970) was the first of the Government of Malaysia's 5-year development expenditure blueprints. The latest, the 10th Malaysia Plan will be in effect from 2011 to 2015.

Realising the need for a long-term water resources development strategy and master plan, the Government has carried out a National Water Resources Study (1982) to develop a comprehensive and coordinated water resources development programme for the country. The study has formulated a long-term plan for flood mitigation works in various flood-prone areas of the country. This includes improvement of 850 km of river channels, construction of 12 multi-purpose dams, 82 km of flood bypass, 12 ring bunds around urban centres, and resettlement of about 10,000 people in flood-prone areas. The whole plan was estimated to cost RM2.55 billion (1982 estimate) over a period of 20 years and will provide protection to some 1.8 million people.

A number of studies have also been carried out to alleviate flooding problems in major towns around the country. These include the Cukai Flood Mitigation Study, Lower Perak Flood Mitigation Study and the Kangar Flood Mitigation Study as well as drainage master plan studies for the towns of Butterworth and Bukit Mertajam, Kuala Lumpur, Alor Setar, Sandakan/Tawau/Kota Kinabalu, Bintulu, Johor Bahru, Kelang and Port Kelang, Seremban, Melaka, Kuantan, Kota Bharu, Kuala Terengganu, Port Dickson, Raub, Kerteh, Teluk Intan, Penang, Langkawi, Batu Pahat, Sungai Petani, Kuching, Ipoh and the Multimedia Super Corridor (MSC).

Costs and Returns

Project Outcome

The outcome of flood mitigation projects are evaluated based socio-economic factors. A reduction in flood area, frequency of flood occurrence, and numbers of populace effected are used as key performance indicators of flood mitigation projects. Flood mitigation project outcomes are determined from surveys part of which are garnered from flood damage assessment exercises. With the advent of Geographical Information Systems, flood hazard maps have become an important tool in evaluating the effectiveness of flood projects by way of comparing actual flood areas against the predicted flood areas under a given level of protection.

Future Investments

It is estimated that flood mitigation expenditure over the next 15 years for the outstanding flood prone areas would be around RM19 billion (USD5.94 billion).

Flood Management

Flood Management After 1971

Prior to 1971, the response by the Government to mitigate flood disasters were at best piece-meal and reactive. It was not until the aftermath of the great flood of 1971 that the Malaysian Government's flood mitigation strategy became properly framed and entrusted to the Department of Irrigation and Drainage (DID). Working with other agencies, the DID was responsible for implementing the engineering components under the following seven initiatives to address floods:

1. Formation of the Permanent Commission on Flood Control
2. Formation of a mechanism for flood disaster relief
3. Conduct studies on river basins and formulation of urban drainage master plans for major towns
4. Implement structural measures
5. Implement non-structural measures
6. Develop flood prediction and early-warning system
7. Develop network of hydrology and flood data collection stations

From the studies that have been carried out, various structural (curative) as well as non-structural (preventive) measures have been proposed to alleviate the flooding problem. Even in the early 1970s, it was realised that flood relief projects alone did not alleviate flood woes. Non-structural measures that controlled land development were needed. The flood problem had to be addressed from a river basin management perspective.

Structural Measures

Flood mitigation began with flood relief projects which were purely structural in nature and focused at local problems. Under structural measures, engineering methods are used to solve the flooding problem. The river capacity can be increased to accommodate the surplus runoff through channel improvement, construction of levees and embankments, flood bypasses, river diversions, poldering, and construction of flood storage dams and flood attenuation ponds, either singly or in combination. These are briefly described below:

(i) Flood Control Dams

Flood control dams are constructed to retain flood water in order to protect areas downstream. It is generally economically not viable to construct dams solely for flood control hence these dams serve other purposes such as power generation, domestic water supply or irrigation with a portion of their capacity allocated for flood detention. Among the dams specially constructed for flood mitigation are Batu Dam, Semberong Dam, Bekok Dam and Macap Dam while irrigation dams include Muda Dam, Pedu Dam, Timah Tasoh Dam, Bukit Merah Dam and Beris Dam. Hydro-electric dams built by Tenaga Nasional Berhad[2] include Kenyir Dam, Bersia Dam, Kenering Dam, Temenggong Dam and Sultan Abu Bakar Dam. The Klang Gates Dam in Kuala Lumpur is an example of a dam built for water supply but also serves as a flood mitigation dam.

(ii) Canalisation and Related Works

Canalisation works include the widening and deepening of channels as well as lining the banks and beds of the channels. They also include the replacement of undersized structures such as bridges. These works are necessary as the original channels have become undersized as a result of the increase in flood flows caused by development.

[2] Tenaga Nasional Berhad (TNB) is Malaysia's largest electric utility company

(iii) Bunding of Rivers

Bunding of rivers reduces the chances of flooding of the low-lying adjacent areas. This option may give rise to problems of internal drainage as a result of the bunding. Bunding an urban area introduces a high flood damage potential as any occurrence of flooding as a result of flood water overtopping or breaching the bund would be very damaging.

(iv) Storage Ponds of Flood Attenuation

Ponds such as disused mining pools can be used for flood storage. The objective is to divert the flood water through such ponds and thus regulate the outflow so that the flood peaks[3] are attenuated. This strategy has been used in the case of Batu/Jinjang Pond Project in Kuala Lumpur where excess flood waters are diverted from Sg. Gombak to Batu Pond for temporary storage and from Sg. Keroh to Jinjang Pond. Water in the pond will be released slowly back to the river after the flood flow has subsided.

(v) Poldering (Ring Bund/Ring Embankment)

Poldering is the provision of a ring bund surrounding the area to be protected. This is normally carried out for an area which has high damage potential but for which the cost of overall basin-wide protection would be prohibitive. It includes the provision of internal drainage for the area to be protected and the evacuation of flood waters by pumping during periods of high river flows. This technique has been proven effective in controlling floods and is usually the only option available for built-up areas. However, structural measures usually incorporate "hard" engineering measures that result in bigger channels conveying high flows at high velocities. These measures incur high costs as well as require substantial land reserves for the channel.

(vi) Flood Diversion Channel or Tunnel

In major cities, rapid urbanisation causes tremendous increase in flood discharges which exceed river flow capacities. Extensive development adjacent to rivers however limit the space required for river widening projects. Under such circumstances, excess flood water has to be retained upstream in storage ponds or diverted downstream through a flood diversion channel or tunnel. Both concepts have been implemented in the Kuala Lumpur Flood Mitigation Project. A component of this project is the Stormwater Management and Road Tunnel (SMART) Project completed in 2007. The SMART system alleviates flooding in the Kuala Lumpur city centre by diverting large volumes of flood water from entering the city centre. The 9.7 km tunnel is designed to convey stormwater while a 3 km portion of it also serves as a motorway. The motorway eases daily traffic congestion at the southern gateway to KL City near Sungai Besi. This dual-purpose design is believed to be the first of its kind in the world.

[3] Flood peaks refer to maximum river flow levels at the peak of the flood event

Non-structural Measures

Non-structural measures are proposed where engineering measures are not applicable or viable or where supplemental measures are required. They include restriction of development in flood prone areas, land-use zoning, resettlement of population, flood proofing, and flood forecasting and warning systems. These measures are often installed to make-up for compromises in the design level of protection.

(i) Floodplain Management

The most important non-structural measure is floodplain management where development of land within or adjacent to flood plains are controlled (see Figure 4). The local government or district office is responsible for the development planning process and can restrict land-use within the flood plain or set specific requirements for approval.

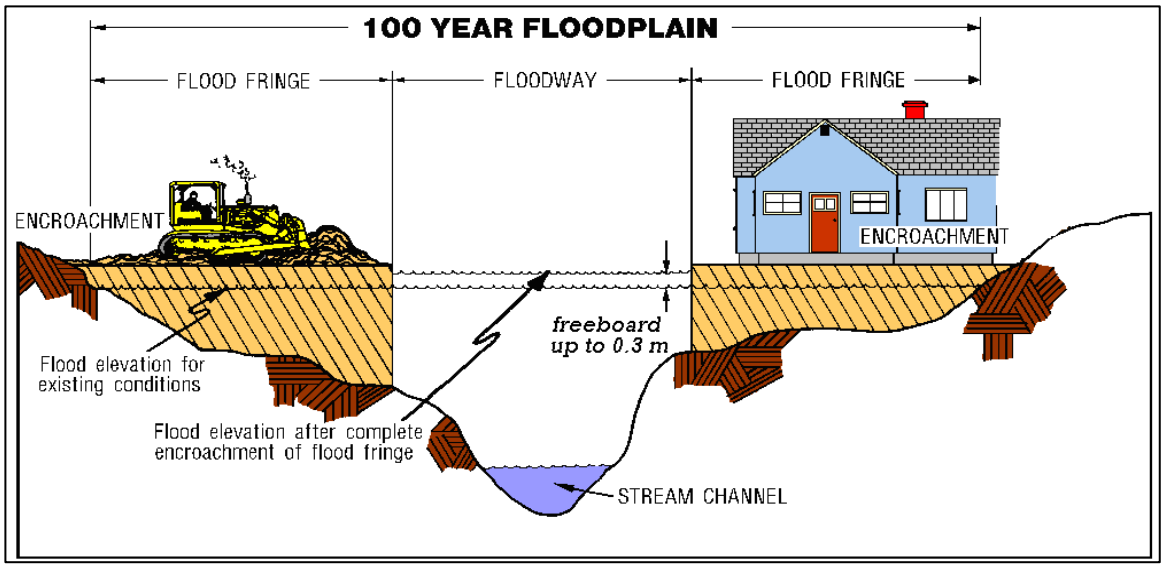


Figure 4: Encroachment of development into the 100-year flood plain

(ii) Early-warning Systems

Early flood warning systems were installed as far back as 1925 in Kelantan. After the 1971 floods, more advanced systems were installed. To date, DID has established about 335 telemetric rain-gauges and 208 telemetric water level stations in the vicinity of 40 river basins for real time flood monitoring. At these stations, three critical flood levels are designated, namely *Alert*, *Warning* and *Danger*. In addition, 400 river observation points are provided with manual flood gauges and more than 250 siren stations has been established.

(ii) Urban Stormwater Manual and Guidelines

The issuance of the *Urban Stormwater Management Manual for Malaysia* (elaborated further in later paragraphs) provided a guide to consultants and developers for drainage and environmental control for proposed development. Adherence to

guidelines are monitored by local governments and technical agencies. Other than the above manual, specific guidelines such as for the prevention of flood in basement carparks and designing flood proofing for buildings have also been issued.

(iii) Risk Assessment and Flood Maps

In preparing the public for disasters, risk assessment is critical. Flood risk assessment requires the spatial aspect of floods to be clearly determined. Risk maps include inundation maps of historical events and flood hazard maps which are predicted scenarios derived from flood modelling. They facilitate the design of emergency evacuation plans.

Best Practise and Strategies

Flood Mitigation Design

Effective engineering solutions for flood mitigation must be supported by technical studies which detail flood hazard areas, modelled scenarios and potential damage assessments all resolved at the catchment level. The urban drainage master plans have been an effective management tool in guiding and refining structural engineering solutions. Flood mitigation design criterion considers many variables some of which are time-based and location specific. The level of protection in terms of the Average Recurrence Interval (ARI) is related to a hydrologic (rainfall, river flow) condition and based on historical data. The selected ARI frames a design to mitigate a rare event of considerable magnitude. Urban areas within agricultural regions are typically designed for 1:20 to 1:50 years ARI while a 1:100 years ARI is standard for densely populated urban catchments urban catchments. In all cases, the greater the ARI the higher the potential risk to human life and property, loss of income, damage to economy and societal cohesion. In reality, implementation of a project is constrained by land availability, social issues and monetary resources hence a compromised ARI design is eventually constructed. In most projects, a selected design level of protection is usually tested against a 1:100 ARI flood to ascertain the risk. Non-structural measures such as early-warning systems are then added to keep flood risks low.

Integrated Flood Management

A major shift in strategy took place in 2000 when the DID introduced the environmentally-friendly *Urban Stormwater Management Manual for Malaysia*. It signaled the beginning of Integrated Flood Management (IFM) as the underpinning strategy for flood mitigation. A subset of the Government's broader Integrated Water Resource Management initiative, flood management, like all other water resource issues, are to be addressed at the river basin level. In IFM, the river basin and flood plain is recognised as a dynamic environment where the management of land and water issues are integrated. IFM promotes a participatory approach and cross-sectoral interaction in decision-making adopting the best mix of strategies.

With the new manual in place, drainage control conditions are strictly imposed upon developers as a pre-requisite for development approval. Technically, the manual provides guidelines for control of erosion and sediment, stormwater quantity and stormwater quality. Key amongst this is that the estimated excess flows arising from new development are to be contained before being release into the main drainage system. Every new development is compelled to allocate land for flood detention. Structurally, IFM promotes a change in design concept – rapid-disposal, which was the primary design objective of earlier flood mitigation projects, have being replaced by storage, increased permeability and flow reduction.

IFM promotes public awareness of flood hazards and integrates its management together with other hazards such as bund breach and landslides. IFM, in tandem with other hazard management efforts are designed to create a high level of disaster preparedness and for the public to 'live and adapt' with floods as part of life. With climate change scenarios indicating higher annual rainfalls and more high intensity rainfall events in the future, IFM's proactive measures prepares the public with the knowledge of how disasters happen and how to reduce damages. This keeps in line with the National Climate Change Policy which is to "Ensure climate-resilient development to fulfill national aspirations for sustainability".

Recent Developments

Recently, much effort and advances have been made in raising awareness amongst the public. Websites with flood related information has been set-up where the public can access real-time flood information. Emergency messages via SMS have also been made available to residents of certain flood prone areas where there is insufficient lead time to warn of floods. Current and new projects include public awareness components and community programmes.

On the scientific aspect, the use of Supervisory Control and Data Acquisition (SCADA) and telemetery in the operations of flood mitigation structures and early-warning systems has been intensified to provide better control and efficiency. The government has also begun to incorporate atmospheric modelling elements in flood forecasting with the intent of acquiring more lead time to operate flood diversion structures as part of disaster response.

Conclusion

The flood phenomena is a permanent feature of the Malaysian landscape hence the current message to the general public is to live and adapt rather than to rely entirely on engineering intervention. A difference exists between flood control and flood management. The former is reactive while the latter is proactive. Engineering intervention should be part of a holistic solution to alleviate flood woes rather than a symptomatic cure for a local flood problem. Integrated Flood Management has become a key element in disaster management as its components encompasses preparedness, mitigation and response. In flood management, threat identification, inventoring, mapping and modelling are the non-structural elements that ascertain

its risk level. The rising expenditure in flood mitigation reflects the seriousness of the government in managing floods effectively especially in urban areas where land is limited and solutions must be fitted around existing development. The greater emphasis on non-structural components is expected to lead to greater optimisation of the design of structural solutions. IFM therefore is key towards reducing the nation's risk from flood disasters.

Reference

Roseli, M. (1999). *Hydrological and Hydraulic Sensitivity Analyses for Flood Modelling with Limited Data. Ph.D Thesis, University of Birmingham, Birmingham, United Kingdom.*

Department of Irrigation and Drainage (2009). D.I.D. Manual Vol. 1 - Flood Management; Government of Malaysia, 2009.

JPS (2007). Ringkasan Laporan Banjir Disember 2006 Negeri Johor. Bahagian Hidrologi dan Sumber Air, Jabatan Pengairan dan Saliran Malaysia