An Annual Report of the Construction Industry of China Hong Kong

2006-2007

prepared by

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About the Research Centre for Construction and Real Estate Economics (RCCREE):

The RCCREE is the Hong Kong Polytechnic University Centre for solution oriented research and consultancy in construction and real estate economics. It undertakes internationally relevant multi-disciplinary research that supports the advancement of the construction and real estate industries in the following areas: Economic Policy and Institutional Analysis, Real Estate Economics, Construction Economics, Housing, Human Behaviour in Economic Decision making, and Value Management and Facilities Performance. For further information, please contact Professor Francis K.W. Wong, Director of RCCREE (bskwwong@polyu.edu.hk) or Professor Eddie C.M. Hui, Deputy Director (bscmhui@polyu.edu.hk).

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[As at October 2007, 1,000 South-Korean Won = HK$ 8.46, US$ 1 = HK$ 7.76]

1. EXECUTIVE SUMMARY

Hong Kong enjoyed a high growth rate in GDP in 2006 (6.9%), with a per capita GDP of US$27,565. While the service sector saw the highest growth (8%), the construction sector suffered with a -4.6% growth. The outlook for 2007 is promising with a similar estimated GDP growth, which was greatly attributed to the influx of capital from all over the world and in particular China to invest in both the stock market and real estate properties.

With respect to the labour market, the unemployment rate has hit a all-time low at around 4%. Nevertheless, the construction sector saw a steady decreasing in jobs available, i.e. 20% decrease from the 4th quarter of 2004 to the first quarter of 2007. This is partly attributable to the increase in mechanization and pre-cast techniques; and greatly a result of reduction in projects available.

Construction Cost has picked up after it hit a bottom in 2003. It is more or less in parity of 1997 when the construction cost was at its peak. The high construction cost can be reflected from the increase in construction materials. The prices of major construction materials such as hardwood and steel products have risen by as much as 40% over 2 years.

While there was no published wages for construction workers, the wages have not risen in par with the rise in living standard as reflected from the recent 40-day strike by the bar benders in Hong Kong, which has led to a near stand-still of the construction industry. The salaries of ATPC have risen by an average of 9-13% over 2 years, with the exception of project managers and safety officers.

There is no institutional or legal entry barrier to the construction market in Hong Kong. Foreign firms are required to fulfil the same set of criteria as local firms to get listed with the authority. Hence, the import of construction services does not appear to be very active and has consistently stayed at less than 4% of the total construction volume. However, it should be noted that major infrastructure and civil engineering market has always been dominated by international contractors. Meanwhile, the traditional building market has been dominated by the local indigenous contractors, who are not active, as yet, in the international construction market. Export of construction services thus has accounted for 4% only, same as the amount of imports.

The outlook of the construction industry looks promising in the next 10-15 years as the government has outlined a series of infrastructural projects, many of which are cross-border such as the bridge linking Hong Kong, Macau and Zhuhai. It is envisaged at least HK$250 billion public money will be spent.

2. MACRO ECONOMIC REVIEW AND OUTLOOK

2.1 MAIN MACROECONOMIC INDICATORS

	2000	2001	2002	2003	2004	2005	2006
GDP and Components							
GDP at constant (2000) market prices (HK$ million)	1,314,789	1,323,167	1,347,495	1,390,610	1,509,915	1,623,479	1,735,882
GDP at current market prices (HK$ million)	1,314,789	1,298,813	1,276,757	1,233,983	1,291,425	1,382,675	1,474,319
GDP growth (%)	10	0.6	1.8	3.2	8.6	7.5	6.9
Primary sector (HK$ million)	1,161	1,177	1,138	940	985	947	n.a.
% growth	-21.4	1.4	-3.3	-17.4	1.9	-1.1	n.a.
Manufacturing sector (HK$ million)	67,646	59,760	51,396	44,403	44,455	45,547	n.a.
% growth	6.8	-11.7	-14.0	-13.6	0.1	2.5	n.a.
Services sector (HK$ million)	1,087,570	1,088,211	1,091,272	1,073,941	1,103,695	1,221,064	n.a.
% growth	5.4	0.1	0.3	-1.6	5.3	8.0	n.a.
Construction sector (HK$ million)	62,054	57,167	51,534	44,910	40,376	38,538	n.a.
% growth	-5.3	-7.9	-9.9	-12.9	-10.1	-4.6	n.a.
Demographic Indicators							
Population	6,711,500	6,730,300	6,725,800	6,764,200	6,797,700	6,837,800	6,909,500
Population growth rate (%)	1.1	0.3	-0.1	0.6	0.5	0.6	1.0
Total labour force	3,374,200	3,425,900	3,474,000	3,472,500	3,515,900	3,538,100	3,581,400
Labour force growth rate 9%)	1.6	1.5	1.4	0	1.3	0.6	1.2
Unemployment rate (not seasonally adjusted)	4.9	5.1	7.3	7.9	6.8	5.6	4.8
Financial Indicators							
Changes in consumer price index (%)	-3.8	-1.6	-3.0	-2.6	-0.4	1.0	2.0
Changes in GDP deflator (%)	-5.6	-1.8	-3.5	-6.4	-3.6	-0.4	-0.4
Short term interest rate* (%)	6.21	3.45	1.60	0.81	0.25	2.88	4.05
Long term interest rate** (%)	7.48	6.37	5.40	3.93	4.59	3.55	4.83
Annual average exchange rate with $US(HK$)	7.791	7.799	7.799	7.787	7.788	7.777	7.768

Notes
n.a.: data not available
* yield of 91-day Exchange Fund Bills (mid-year)
**yield of 10-year Exchange Fund Notes (mid-year)

Sources:
GDP, Demographic and Financial Indicators:
Government of the HKSAR web-page at http://www.censtatd.gov.hk/hong_kong_statistics
Short and long term interest rates:
Monthly Statistical Bulletin, Hong Kong Monetary Authority.

Table 2.1 – Macro-Economic Indicators

2.1.1 Overview of National Economy

According to the Economic Analysis and Business Facilitation Unit (2006) of the Hong Kong Government, growth in GDP was 6.9% in 2006. The years of 2004, 2005 and 2006 marked the largest growth in any three consecutive years since 1988. GDP per capita was HK$215,006 (US$27,565), which represented a 5.9% year-on-year growth rate. The growth rate of the services sector was the highest (8%) among all sectors while the construction sector still suffering a negative growth rate of 4.6% in 2006.

The reviving economic performance was greatly attributed to the steady global economic growth and Mainland's policies in favour of Hong Kong, such as the Closer Economic Partnership and Individual Travel Policy. A strong upward trend in the stock market was underpinned by the improving corporate profits as well as the influx of capital inflow anticipating the appreciation of RMB. The amount of capital raised through the IPO exercises was also record breaking. As of end of 2006, the total capitalization of Hong Kong's stock market ranked the sixth in the world. Consolidation of the property market was observed in the earlier months of the year due to the successive rises in interest rate. Towards the end of the year, the property market started picking up again when the upward trend of interest rate appeared to approach the end.

The labour market continued flourishing since the strong economic recovery kicked off in 2003. Unemployment rate was the lowest over the past 7 years, which fell to 4.8%. The consumer price index only increased 2%, which suggested a moderate inflation in 2006, although there was significant increase of imported foodstuffs and consumer goods due to the weakening purchase power of Hong Kong dollars.

2.2.2 Economy off First Half of 2007

Hong Kong's economy continued to experience a substantial growth rate in the first half of 2007. Estimated GDP growth rate maintained at 6.9% in the second quarter. The performance of the financial sector was spectacular, evidenced by the Hang Seng Index hitting and breaking record high. Although the stock market suffered from the turbulence of the sub-prime mortgage market meltdown in the third quarter, it revived quickly after the announcement of the so-called "through-train" scheme, which allows mainlanders to invest in Hong Kong's stock market directly. Domestic demand was strong and inflation remained mild. The labour market continued to improve with the unemployment rate reached record low at 4.2% since mid-1998.

3. OVERVIEW OF THE CONSTRUCTION INDUSTRY

3.1 CONSTRUCTION INVESTMENTS

The total gross value of construction work performed by main contractors increased by 2.2% in nominal terms from a year earlier to HK$22.9 billion in the second quarter of 2007. After discounting price changes, the total gross value of construction work performed by main contractors decreased by 0.1% in real terms over the same period.

Analysed by type of construction work, the gross value of construction work performed at private sector sites totalled HK$7.4 billion in the second quarter of 2007, up by 20.7% in nominal terms from a year earlier. In real terms, it increased by 16.8%. The increase was mainly associated with the progressive stepping up of works at some large commercial building sites and some sports & recreation projects.

The gross value of construction work performed at public sector sites decreased by 11.4% in nominal terms from a year earlier to HK$3.5 billion in the second quarter of 2007. In real term, it decreased by 10.1%. The decrease was mainly due to completion of works on some large transport projects.

Commercial building projects constituted the second largest category of construction site work. The gross value of construction work performed for these projects totalled HK$2.9 billion, representing a significant increase of 84.3% in nominal terms from a year earlier. On a seasonally adjusted basis, the gross value of construction work performed by main contractors increased by 2.8% in nominal terms or increased by 2.1% in real terms in the second quarter of 2007 compared with the first quarter of 2007.

The outlook for the next years and thereafter is promising as the Chief Executive of Hong Kong has outlined 10 major investment plans including:

1. South Island Line
2. Shatin to Central Link
3. Tuen Mun Western Bypass and Tuen Mun-Chek Lap Kok Link
4. Guangzhou-Shenzhen-Hong Kong Express Link
5. Hong Kong-Zhuhai-Macau Bridge
6. Hong Kong-Shenzhen Airport Co-operation
7. Hong Kong-Shenzhen Joint Development of the Lok Ma Chau Loop
8. West Kowloon Cultural District
9. Kai Tak Development Plan
10. New Development Areas (NDAs)

It is envisaged that over HK$250 billion will be invested in the next decade.

3.2 CONSTRUCTION COMPANIES

The latest published statistics from the Census and Statistics Department shows that the number of establishments engaged in building and civil engineering industries is 17,985 as of 2005 whereas the number of persons directly engaged in these industries is 122,870. The following table shows the three year trend from 2003 to 2005.

	2003	2004	2005
Number of Establishments	19,520	18,302	17.985
Number of Persons directly engaged	124,933	122,077	122,870

Table 3.2 – Number of establishments, and of persons directly engaged

3.3 EMPLOYEES AND CONSTRUCTION LABOR (NUMBER OF CONSTRUCTION WORKERS BY JOB TYPE)

3.3.1 Principal Jobs

Job Levels	March 2005
Professional/Technologist	13 991
Technician	29 683
Skilled & Semi-Skilled worker	46 718
General Worker	16 310
Total	106 702

Source: *Manpower Survey Reports on the Building and Civil Engineering Industry*, Building and Civil Engineering Industry Training Board, Vocational Training Council, bi-annual issue of 2005.

Table 3.3.1 - Number of workers employed in principal jobs of construction, building and civil engineering and related disciplines

3.3.2 Persons in Establishments

Main industry group	2003	2004	2005
New construction works – Pre-erection works at construction sites	3 932	4 341 (10.4%)	2 004 (-53.8%)
New construction works – Architectural and civil engineering works at construction sites	31 694	28 478 (-10.1%)	29 786 (4.6%)
New construction works – Miscellaneous new construction works	9 471	6 305 (-33.4%)	7 274 (15.4%)
Decoration, repair and maintenance	21 856	25 117 (14.9%)	21 282 (-15.3%)
Special Trades – Erection and general finishing, electrical and mechanical fitting, gas and water fitting and miscellaneous	57 982	57 836 (-0.3%)	62 524 (8.1%)
All construction activities	124 933	122 077 (-2.3%)	122 870 (0.6%)

Source: *The Report on 2005 Annual Survey of Building, Construction and Real Estate Sectors*, The Census and Statistics Department, Hong Kong Special Administrative Region.

Table 3.3.2 - Number of persons directly engaged in the building and civil engineering establishments

3.3.3 Site Workers

The following table reveals that the number of manual workers engaged at construction sites has been decreasing over time in Hong Kong. The phenomenon of reduction of manual workers is twofold: 1) advanced technology or technique greatly simplifies the construction

process and reduce the number of people directly required; and 2) the number of construction projects, no matter in the private or public sector, has been dwindling year by year.

Year	Qtr	Public	% change	Private	% change	Building	% change	Civil Engg.	% change	Total	% change
2007	1	20569	2.77%	29797	-3.85%	36517	0.30%	13849	-5.13%	50366	-1.25%
2006	1	20014	-2.30%	30990	-5.52%	36406	-6.29%	14598	1.12%	51004	-4.28%
	2	20485	4.68%	32801	0.30%	38849	0.08%	14437	7.31%	53286	1.94%
	3	19569	-7.46%	32704	-3.10%	38819	-4.07%	13454	-6.76%	52273	-4.78%
	4	21147	-6.37%	33750	5.90%	40468	4.38%	14429	-8.02%	54897	0.81%
2005	1	22586	-7.08%	31870	-2.06%	38769	-6.01%	15687	0.58%	54456	-4.20%
	2	24306	-8.12%	32540	-3.00%	41250	-0.10%	15596	-16.63%	56846	-5.26%
	3	26454	-7.84%	33547	-9.47%	41293	-9.14%	18708	-7.90%	60001	-8.76%
	4	28704	12.45%	37057	10.86%	45449	16.25%	20312	2.31%	65761	11.55%
2004	1	25525	-4.29%	33426	-6.67%	39097	-8.72%	19854	1.03%	58951	-5.65%
	2	26668	-4.15%	35814	-7.56%	42830	-9.03%	19652	0.86%	62482	-6.13%
	3	27824	6.88%	38741	5.48%	47081	3.64%	19484	12.41%	66565	6.06%
	4	26034	-0.88%	36727	2.27%	45428	2.90%	17333	-3.87%	62761	0.94%

Source: *The Quarterly Report of Employment and Vacancies at Construction* Sites, The Census and Statistics Department, Hong Kong Special Administrative Region.

Table 3.3.3 - Number of Manual Workers engaged at Construction Sites (analyzed by sector and type of project)

3.4 PRODUCTIVITY

3.4.1 Value-added per Employee

Effective cost control increases the efficiency of each unit of resources engaged. The fairly remarkable observations are the positive figures of the value-added per construction workers in 2004 and 2005, as shown in the following table.

Main industry group	2004	2005
New construction works – Pre-erection works at construction sites	41%	28%
New construction works – Architectural and civil engineering works at construction sites	19%	21%
New construction works – Miscellaneous new construction works	37%	33%
Decoration, repair and maintenance	28%	28%
Special Trades – Erection and general finishing, electrical and mechanical fitting, gas and water fitting and miscellaneous	36%	36%
All construction activities	26%	28%

Source: The Census and Statistics Department, Hong Kong Special Administrative Region.

Table 3.4.1 - Value added as percentage of gross output for all building and civil engineering establishments:

3.4.2 Physical Measurement of Construction Production

(Unit: `000 sq.m.*)

End use of building	2003	2004	2005
Private residential premises+	9 563	8 169 (-14.6%)	6 591 (-19.3%)
Office buildings	596	** (**)	** (**)
Hotels and boarding houses	590	654 (10.8%)	794 (21.4%)
Multi-purpose commercial premises	1 385	1 471 (6.2%)	1 303 (-11.4%)
Total	12 646	10 964 (-13.3%)	9 502 (-13.3%)

* Area (sq. m) refers to gross floor area of buildings when completed.
+ Includes buildings purely for residential purpose and combined residential and non-residential buildings.

Source: *The Report on 2005 Annual Survey of Building, Construction and Real Estate Sectors,* The Census and Statistics Department, Hong Kong Special Administrative Region.

Table 3.4.2 - Physical Measurement of Construction Production

3.5. CONSTRUCTION COST

3.5.1 Unit Construction Cost

Construction costs are compiled from average fixed price competitive tenders published by Davis Landon & Seah, a leading cost consultancy firm in Hong Kong. After the peak in 1997, construction costs fell for 6 consecutive years until they reached the bottom in 2003, when Hong Kong was hit by SARS (Severe Acute Respiratory Syndrome). Afterwards, costs have gradually picked up following the recovery of the property and construction markets. The latest figures for 2007Q2 show that construction costs are now almost as well as they were in 1997. Indeed, 5-Star hotels cost more to build than they were in 1997, probably due to the diversion of resources to the hotel construction boom in Macau.

(Unit: HK$/m^2 CFA*)

	Residential (High-Rise)		Commercial office		Industrial		Hotel
	Standard	Luxurious	Standard	Prestige	Light	Heavy	5-Star
1995	8,000-8,500	8,500-10,000	8,500-9,500	12,000 up	4,800-5,000	5,300-6,300	14,000 up
1996	9,000-9,500	9,500-12,500	9,500-10,700	13,000 up	5,400-5,700	6,100-7,200	16,000 up
1997	11,000-12,000	11,500-15,000	11,550-13,500	15,500 up	6,500-7,000	7,100-8,500	19,500 up
1998	10,000-11,000	11,000-13,500	10,500-12,500	14,300 up	5,600-6,200	6,300-7,500	18,000 up
1999	9,800-10,700	10,800-13,200	10,300-12,100	13,800 up	5,500-6,100	6,200-7,100	17,500 up
2000	9,300-10,000	10,500-12,800	9,700-11,500	13,500 up	5,500-6,000	6,000-6,900	17,500 up
2001	9,100-9,800	10,300-12,600	9,700-11,500	13,500 up	5,500-6,000	6,000-6,800	17,500 up
2002	8,500-9,000	9,800-11,700	9,500-11,200	13,500 up	5,400-5,800	5,900-6,600	17,200 up
2003	7,600-8,200	9,000-10,800	9,000-10,600	12,300 up	4,900-5,500	5,300-6,100	16,300 up
2004	7,850-8,450	9,250-11,050	9,300-10,900	12,700 up	5,250-5,850	5,650-6,450	16,700 up
2005	8,300-8,900	9,750-11,600	9,750-11,450	13,300 up	5,550-6,150	5,950-6,800	17,500 up
2006	8,750-9,350	10,350-12,300	10,550-12,350	14,300 up	5,900-6,550	6,350-7,250	18,700 up
2007Q1	9,050-9,650,	10,650-12,700	10,850-12,750	14,800 up	6,100-6,750	6,550-7,450	19,250 up
2007Q2	9,450-10,100	11,100-13,250	11,350-13,350	15,550 up	6,400-7,100	6,900-7,850	20,200 up

* The costs per square metre are based on Construction Floor Areas measured to the outside face of the external walls/ external perimeter including lift shafts, stairwells, balconies, plant rooms, water tanks and the like. The cost excludes site formation works, external works, land cost, professional fees, finance and legal expenses.

1995-2006 based on Quarterly data in Q4. 2007 Q1 is first quarter data and 2007 Q2 is second quarter data.

Source: 1995-2004 *Current building cost information data in Hong Kong*. Davis Langdon & Seah International.
2005-2007 *Quarterly construction cost review, Hong Kong*. Davis Langdon & Seah.

Table 3.5.1 – Unit Construction Costs

3.5.2 Average Wholesale Prices of Selected Building Materials

As the general upward trend of construction costs shown in Section 5.2 would foretell, costs of major building materials have been rising in the last 4 years. As the following table shows, some key materials, such as bitumen, diesel fuel for industrial use, sawn hardwood, homogeneous non-slip floor tiles, galvanised mild steel angles, sand, high tensile steel bars and sawn hardwood timber formwork, have their latest unit costs increased by more than 40% when compared to 2004. This upsurge in material prices is believed to be more attributable to the general increase in prices of commodities around the globe recently, than to the slow recovery of the construction market in Hong Kong.

		2004	2005	2006	2007
Aggregates (HK$ per tonne)		40	38	38	40
Bitumen (HK$ per tonne)		3800	4200	5400	5400
Concrete blocks, 100mm thick		45	42	42	43
Diesel fuel	For industrial use (light)	1108	1320	1568	1572
	For road use (HK$ per 100 litre)	664	770	886	874
Glass - Clear sheet glass, 5mm thick (HK$ per square metre)		81	81	81	87
Glazed ceramic wall tiles	White tiles, 108mm*108mm	66	63	69	77
	Colour tiles, 200mm*200mm	187	192	203	221
Hardwood	Sawn hardwood, 50*75 mm column	2284	3072	3218	3474
Homogeneous floor tiles	Non-slip tile, 200mm*200mm	69	72	86	98
Galvanised mild steel	Steel plates (HK$ per tonne)	6283	6674	6771	7629
	Steel angles (HK$ per tonne)	6203	6568	7404	10047
	Steel flats (HK$ per tonne)	6609	7212	9772	8541
Metal formwork	Steel plate, 4mm thick (HK$ per tonne)	4438	4881	4588	5059
Mosaic tiles	Unglazed tiles, 18mm*18mm	52	44	37	47
	Glass tiles, 25mm*25mm	25	27	22	27
	Glazed tiles, 45mm*45mm	58	55	58	61
Paint	Emulsion paint (HK$ per litre)	32	35	35	35
	Acrylic paint (HK$ per litre)	34	35	34	34
Portland cement (ordinary) (HK$ per tonne)		491	511	517	516
Sand (HK$ per tonne)		25	27	34	56
Steel reinforcement	Mild steel round bars, 6mm to 20mm	3815	4101	4237	5275
	High tensile steel bars, 10mm to 40mm	3668	3764	3877	5183
Timber formwork	Plywood, formwork, 19mm thick	60	67	61	64
	Sawn hardwood, 25mm thick plank	1504	2140	2023	2452
uPVC lined GMS pipes	20mm diameter pipes, 5.5 long	166	170	170	166
uPVC pipes	32mm diameter pipes, 4m long (HK$ per	42	40	41	39

Note 1: Prices from January 2005 onwards are not directly comparable to those published which included delivery charges.

Note 2: Prices are based on June data from 2004 to 2007 and in Hong Kong dollars.

Source: Average Wholesale Prices of Selected Building Materials, Census and Statistics Department, Hong Kong Special Administrative Region (Contact person: Miss Kwan, Telephone: 852-2805-6413).
Web-site: http://www.censtatd.gov.hk (Products and Services - Publications - Commerce and Industry - Average Wholesale Prices of Selected Building Materials).

Table 3.5.2 - Average Wholesale Prices of Selected Building Materials

3.5.3 Average Sectoral Wages per Month

There is no data on the average monthly sectoral wages for the construction industry. In the following table, the FIRE (financing, insurance, real estate and business services) is used instead for comparison with the manufacturing and personal services sectors.

(Unit: HK$ per month)

	Financing, insurance, real estate and business services	Manufacturing	Personal services
2001 Sept	10896	12175	6336
2001 Dec	11845	12106	6183
2002 Mar	10544	11837	6225
2002 June	10557	11922	6247
2002 Sept	10627	12243	6148
2002 Dec	10564	11769	6089
2003 Mar	10561	11433	6051
2003 June	10985	11405	5971
2003 Sept	10574	11648	5983
2003 Dec	10446	11566	5897
2004 Mar	10028	11548	5809
2004 June	9918	11794	6033
2004 Sept	9605	11173	6338
2004 Dec	9786	11483	6071
2005 Mar	9996	11486	5993
2005 June	9472	12054	5917
2005 Sept	9722	11254	5852
2005 Dec	10039	11663	5963
2006 Mar	10055	11867	5859
2006 June	9946	11912	6021
2006 Sept	10222	12079	6018
2006 Dec	10702	12050	6120
2007 Mar	10987	12003	6314

Note 1: The average sectoral wages are extracted from the table of “Average Wage Rates by Industry Sector, Broad Occupational Group”.
Note 2: All the average monthly salaries are extracted from “Supervisory, technical, clerical and miscellaneous non-production workers” sections under the FIRE, Manufacturing and Personal services groups.

Source: *Hong Kong Monthly Digest of Statistics*, The Census and Statistics Department, Hong Kong Special Administrative Region.

Table 3.5.3 - Average Sectoral Wages Per Month

3.5.4 Construction Industry Salaries and Wages –Technicians and Unskilled Workers

Whilst the material costs have been generally on their rising trend, the average monthly salary of technicians and the average daily wage of unskilled workers in the construction industry have not recovered to their levels in 2003. This lends further support to the argument in Section 5.2 that material cost increase has more to do with the global price increase in commodities than to the slow recovery of the home construction sector.

	Technicians Monthly Salary (HK$)	Unskilled Workers Daily Wage (HK$)
2003 June	10985	601.1
2004 June	9918	584.9
2005 June	9472	571.7
2006 June	9946	565.9
2007 June	n.a.	569.9

n.a.: data not available

Unskilled Workers Daily Wage is extracted from "Average Daily Wages of Workers Engaged in Public Sector Construction Projects". Figures are based on the data from "General Workers", which include labourers, excavators, concretors labourers, bricklayer's labourers, plasterer's labourers, heavy load labourers and driver's linesmen.

Technicians Monthly Salary are extracted from "The Supervisory, technical, clerical and miscellaneous non-production workers section" of the "Average Wage Rates by Industry Sector - Financing, insurance, real estate and business services"

Sources: (for unskilled workers' daily wage) Average Daily Wages of Workers Engaged in Public Sector Construction Projects. Census and Statistics Department, Hong Kong Special Administrative Region (Contact person: Miss Lam, Telephone: 852-2887-5207).
(for technicians' monthly salary) Hong Kong Monthly Digest of Statistics, Various issues.

Table 3.5.4 - Construction Industry Salaries And Wages – Technicians and Unskilled Workers

3.5.5 Construction Industry Salaries and Wages – Construction Professionals

There were some wage increases for certain professionals, but in no way comparable with that of material prices. Between 2004 and 2006, only administrative officers / executive officers and architects working in the industry have registered double digit growth. Their monthly wages increased by 13% over two years for the former, and by 11% for the latter. Administration managers and their like enjoyed a 9% growth in their salaries over the same 2-year period, followed by 8% for building services engineers, civil engineers and electrical engineers. Meanwhile, there was a reduction of 4% for safety officers, and 2% for project managers.

(Unit: Median monthly salary in HK$)

Professionals in Building and construction and related trades	2004 June	2005 June	2006 June
Accountant	26900	22900	26900
Administrative Officer / Executive Officer	14900	16900	16900
Architect	38500	41600	42600
Administration Manager/ Company Secretary/ Office Manager	23500	n.a.	25600
Building Services Engineer	28500	29300	30800
Civil Engineer	28700	28000	30900
Electrical Engineer	30200	30700	32700
Financial Manager/ Accounting Manager	n.a.	54500	44600
I.T./ Computer Manager	n.a.	n.a.	35800
Mechanical Engineer	33200	31900	33800
Personnel Manager/ Human Resources Manager/ Staff Relations Manager	n.a.	n.a.	35000
Project Manager	52200	50900	51300
Quantity Surveyor	28800	28700	29300
Safety Officer	31600	29800	30300
Structural Engineer	26800	21000	27500

n.a. : data not available

Source: Report of Salaries and Employee Benefits Statistics, Managerial and Professional Employees (Excluding Top Management), Wages and Labour Costs Statistics Section, Census and Statistics Department, Hong Kong Special Administrative Region.
Web-site: http://www.censtatd.gov.hk (Hong Kong statistic- Statistical Tables-Subject-Labour - Table 029).

Table 5.5 - Construction Industry Salaries And Wages – Construction Professionals

3.5.6 Construction Industry Salaries and Wages – Skilled Workers

The slow recovery of the construction industry seems to have benefited, if only marginally, some senior managers, architects and engineers only. Of all the 32 categories of workers listed below, only 7 of them had their average daily wages increased over 4 years. Structural steel welders had the highest pay rise: 10% over 4 years, that is, 2.4% per annum for 4 years in a row. The other 6 categories had their average daily wages increased by 2% to 6% only over the same 4-year period. They are, of course, the better ones already, because the remaining 25 categories of skilled workers have seen their wages go down by 1% to 46%. The hardest hit are the building services maintenance mechanics. Their average daily wages dipped by 46% over 4 years, or 14% per annum for 4 consecutive years. The categories of workers that suffered double-digit wage reduction over 4 years include nearly all the major trades: concretors, bricklayers, drainlayers, bar benders and fixers, structural steel erectors, riggers/metal formwork erectors, formwork carpenters, joiners, plumbers, construction plant mechanics, rock-breaking drillers, plasterers, glaziers, painters and decorators, marble workers, and mechanical fitters. It seems that the construction boom in Macau has not benefited much local construction workers.

(Unit: Average daily wage in HK$)

	2003 June	2004 June	2005 June	2006 June	2007 June
Concretor	1072.4	1026.3	923.5	940.3	948.2
Bricklayer	971.9	961.3	886.3	840.1	841.3
Drainlayer	955.6	927.5	874.7	861.9	826.5
Mason	903.7	849.9	853.2	933.6	925.2
Bar bender and fixer	1297.4	1225.4	1159.6	1154.0	1142.9
Metal worker	890.4	853.1	840.9	822.3	914.2
General welder	848.9	790.1	783.7	786.6	778.3
Structural steel erector	1063.1	966.2	961.8	884.8	847.5
Structural steel welder	879.7	939.0	946.2	920.2	970.7
Rigger/metal formwork erector	980.7	810.4	724.1	777.7	843.4
Carpenter (formwork)	1254.0	1146.9	1073.7	1076.9	993.1
Joiner	1059.2	1029.4	982.1	953.9	926.7
Plumber	986.8	933.8	903.3	836.8	798.8
Construction plant mechanic	859.8	802.7	807.6	816.5	774.3
Plant & equipment operator (load shifting)	809.2	784.4	765.6	767.0	761.6
Truck driver	653.1	604.6	572.5	613.1	591.7
Rock-breaking driller	889.8	821.0	851.2	781.7	774.3
Asphalter (road construction)	876.6	715.3	783.9	756.9	913.9
Bamboo scaffolder	1164.6	1077.3	1089.1	1108.3	1076.7
Diver	1725.2	1596.4	1687.4	1543.3	1821.1
Plasterer	976.1	934.9	883.3	890.3	829.6
Glazier	895.5	843.2	878.2	770.0	751.9
Painter and decorator	907.7	878.4	853.6	791.2	753.0
Leveller	771.0	757.9	700.3	726.7	715.4
Marble worker	1132.7	1003.2	969.2	826.1	866.6
Electrical fitter (incl. electrician)	794.6	763.7	742.0	715.1	727.7
Mechanical fitter	764.2	752.5	705.1	589.1	666.0
Refrigeration/AC/ventilation mechanic	675.9	685.1	659.3	595.4	638.4
Fire services mechanic	797.6	762.7	758.2	737.8	788.6
Lift and escalator mechanic	769.1	785.7	820.8	815.7	804.5
Building services maintenance mechanic	987.2	728.9	852.9	743.7	537.5
Power cable jointer	575.0	725.6	831.3	600.0	600.0

Source: Average Daily Wages of Workers Engaged in Public Sector Construction Projects, Census and Statistics Department, Hong Kong Special Administrative Region (Contact person: Miss Lam, Telephone: 852-2887-5207).

Table 5.6 - Construction Industry Salaries And Wages – Skilled Workers

1

3.6 IMPORT AND EXPORT OF CONSTRUCTION SERVICES

3.6.1 Annual Import/Export of Construction Services

Latest statistics on import and export of services can be found on “Report on Hong Kong Trade in Services Statistics for 2005” which is freely downloadable from the government web-site (http://www.statisticalbookstore.gov.hk/en/index.html). However, the construction sector is described as one of the sectors which have less significant amount of TIS (Trade in Services) transactions”. There is not much import of construction services because the great majority of construction works are done by “local” firms. However, that doesn’t imply

discrimination against foreign contractors as the next paragraph will explain. Neither is there much export of construction services, because indigenous local contractors are generally active in the traditional building construction sector, and they may not have the competitive advantages to compete in international markets yet.

Hong Kong has been consistently ranked the top in the Index of Economic Freedom for 13 consecutive years ever since it was first co-published by The Heritage Foundation and The Wall Street Journal in 1995. Hong Kong being the freest economy in the world, the local government does not differentiate between foreign and local contractors. Announcing with a Technical Circular (*Works Branch Technical Circular No. 9/97: Rules for the Administration of the List of Approved Contractors for Public Works, 26 May 1997*), the government has abolished since 1997 the differentiation between foreign and local contractors eligible to tender for public works. From then on, both foreign and local contractors have been subject to the same sets of criteria, rules and regulations. Once registered, they are all "local" firms, and, by definition, their services are rendered locally and not "imported". There is no statistics on the origin of the contractors, and hence there is not much "importation" of construction services expect for those one-off special cases when construction services have to be procured on an *ad hoc* basis.

The exports and imports of services are listed below:

		Export of services			Import of services			Net export of services
Major Service Group	Year	HK$ million	Share[3] (%)	Year-on-year % change	HK$ million	Share[3] (%)	Year-on-year % change	HK$ million
Construction services[1]	2003	3968	3.4	48.2	3110	2.7	13.9	858
	2004	2941	2.7	-25.9	2697	2.5	-13.3	244
	2005	2436	2.3	-17.2	2122	2.0	-21.3	314
Architectural, engineering and other technical services[2]	2003	590	-	74.0	207	-	32.7	383
	2004	929	-	57.5	246	-	18.8	683
	2005	1035	-	11.4	283	-	15.0	752

[1]Construction services include "(g)eneral construction work (including new work, additions and alterations, repair and maintenance) and installation work at sites, buildings and structures that usually lasts for less than one year".

[2]Architectural, engineering and other technical services include "(a)dvisory architectural services; architectural design services; contract administration services; advisory and consultative engineering services; engineering design services for construction projects or industrial processes; and urban planning and landscape architectural services".

[3]Share (%) is the share of export (or export) in total "building and construction".

Sources: *Report on Hong Kong Trade in Services Statistics for 2005*, p.15.
2006 Gross Domestic Report, p.41

Table 3.6.1 – Annual Import/Export of Construction and Consultancy Services

There is not much import nor export of construction services, though Hong Kong managed to have a positive net export of services between 2003 and 2005. In 2005, there were HK$2436 million and HK$2122 million worth of construction services exported and imported

respectively, resulting in a net export of services worth HK$314 million. The value of exported construction services represented 2.3% – 3.4% of the total "Building and Construction" only in the years 2003 - 2005, or a mere 0.5% of the total value of all exports of services in 2005.

On the other hand, there is an increasing trend of export of Architectural, engineering and other technical services. The value increased to HK$1,035 million in 2005. In that year, the total value of "Building and Construction" was HK$105,964 million. If we assume that professional fees amounted to 3% of the value, the consultancy fees would be HK$3,179 million. Compared to HK$3,179 million, the HK$1,035 million earned from export of services amounted to more than 30%. In Hong Kong, architects, engineers and other professionals appear to have relied on export of services much more than the contractors. It has been commented that professional skills and expertise, which have their origins from the British institutions, have been much treasured by China Mainland, Dubai, India and other South East countries. In Hong Kong professionals seem to have more exportable advantages than building construction firms.

3.6.2 Top 5 Countries for Construction Import/Export

The sources of imports and destinations of exports of construction and consultancy services are summarised in the following table.

Major service group/Region	Year	Export of services	Import of services	Net export of services
		HK$million	HK$million	HK$million
Construction services	**2003**	**3968**	**3110**	**858**
	2004	**2941**	**2697**	**244**
	2005	**2436**	**2122**	**314**
Asia	2003	3737	2749	988
	2004	2941	2166	775
	2005	2330	1959	371
Australasia and Oceania	2003	<0.5	**	**
	2004	<0.5	**	**
	2005	**	<0.5	**
Central and South America	2003	**	**	**
	2004	<0.5	<0.5	<0.5
	2005	<0.5	<0.5	<0.5
North America	2003	12	**	**
	2004	<0.5	**	**
	2005	**	**	**
Western Europe	2003	**	**	**
	2004	<0.5	**	**
	2005	<0.5	**	**
Others	2003	<0.5	<0.5	<0.5
	2004	<0.5	<0.5	<0.5
	2005	<0.5	<0.5	<0.5
Architectural, engineering and other technical services	**2003**	**590**	**207**	**383**
	2004	**929**	**246**	**683**
	2005	**1035**	**283**	**752**
Asia	2003	491	93	398
	2004	780	154	626
	2005	913	166	747
Australasia and Oceania	2003	2	2	<0.5
	2004	**	**	**
	2005	6	**	**
Central and South America	2003	<0.5	<0.5	<0.5
	2004	<0.5	<0.5	<0.5
	2005	<0.5	<0.5	<0.5
North America	2003	43	7	36
	2004	107	44	63
	2005	52	16	36
Western Europe	2003	48	**	**
	2004	4	42	-38
	2005	22	82	-60
Others	2003	7	**	**
	2004	**	**	**
	2005	43	**	**

** Data suppressed for confidentiality reason

Sources: *Report on Hong Kong Trade in Services Statistics for 2005*, p.28.

Table 3.6.2 – Source/Destinations of Import/Export of Construction & Consultancy Services

Most of the import and export services are carried out within the Asian region. Export of construction services to regions outside Asia is negligible. However, consultants have generated some revenues from places outside Asia, for example, the North America and Western Europe. For example, in the year 2004, they generated HK$107 million from North America. That was almost 12% of the total revenues they got from exporting their services.

Similarly, North America and Western Europe are the second and third largest sources of imports of consultancy services. In the year 2005, the two regions imported 29% and 6% respectively of all the services.

There has been more evidence of globalization of construction market in the complex infrastructure sector than in the traditional building and housing sector. Generally speaking, international contractors dominate the civil and infrastructure construction market, whilst local or "localized foreign" contractors the technologically traditional building and housing construction sector. Local contractors are mostly active in the traditional building sector. In recent years, they have found opportunities working in Macau, which is after Hong Kong the second Special Administrative Region of the People's Republic of China and is less than one hour away from Hong Kong by hydrofoils. There has been a construction spending spree on the peninsula and the two islands. The construction of casinos and hotels has brought opportunities to building contractors in Hong Kong. There is however no official statistics on how much work Hong Kong contractors have procured. Other than Macau, there are incidences of local contractors working in Dubai and India. However, it is believed that construction volume so secured has been minimal only. According to people from the industry that we interviewed, contractors from Hong Kong rather than China Mainland are employed in Macau because Hong Kong firms are perceived to provide better project management skills. However, many construction workers are either legally or illegally employed from China Mainland. The construction boom in Macau has benefited local construction managers, professionals and technicians more than site workers, though a small number of Hong Kong skilled workers such as steel-benders are recruited in Macau.

TWO CASES of INNOVATION in the HONG KONG CONSTRUCTION INDUSTRY

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The Centre for Construction and Real Estate Economics, HK Polytechnic U

INTRODUCTION

Past Innovation in General

Innovation in construction is always an ongoing process. We have only to compare construction today with construction say 50 years ago, to appreciate what enormous changes have occurred. Even routine structural concrete, for instance, is much stronger, is easier to work with , sets more quickly and its quality on delivery is much less variable. Many new techniques and materials have appeared and construction plant has developed both in power and versatility .There has been a steady trend towards more and more offsite fabrication for structural and mechanical elements .

Industry organizes itself in new ways too. Various contract forms and methods of cooperation between parties have developed: there is more use of subcontracting; management principles are applied more professionally : thanks to the computer much better management information and design tools exist , introducing enormous changes in the way things get done.

These improvements have occurred because researchers, industry innovators and plant manufacturers have steadily pushed the boundaries forward.

Current and Future Innovation in Hong Kong

We now seem to have reached the stage where INNOVATION itself is seen almost as a distinct activity in its own right. Innovation is to be no longer left only to initiative and opportunity but the community seems to expects it to be consciously achieved by an Industry acting collectively.

The HK Government established a Construction Industry Review Committee (CIRC) which published its report “Construct for Excellence “, in 2001. That report contains 109 recommendations for advancing the Hong Kong construction industry. In particular, the report specifically charges the industry to collectively develop a **culture of innovation** , to deliberately concentrate on and foster innovation both in technology and in processes.

Innovative ideas and actions are being promoted on a variety of fronts, movements in the direction of sustainable development featuring particularly large for example. Industry, Academia, and Government Depts. have responded well to the CIRC report and the climate at present is one which welcomes innovative ideas.

Following the CIRC report, a Provisional Construction Industry Coordination Board (PCICB) was established to act as a conduit between Government and Industry and to implement the CIRC recommendations. Recently, on 1st February 2007, the Construction Industry Council (CIC) was established as a statutory body to replace the PCICB. Government departments in the meantime have been proactive in encouraging 'greener buildings' and in increasingly allowing, for example, a performance based approach to design. A worker registration scheme is now in place to improve worker quality. Formal assessment of the standards being achieved by a particular building is encouraged, the use of the 'instrument' HK- BEAM (Building Environmental Assessment Method) being prominent, and many recommended environmental target standards have been issued by Government. Such assessments and target recommendations , however , remain only voluntary for the private sector. The HK government , as is traditional, so far still likes to avoid compulsion except in matters of safety and health.

Interesting developments arising from the new climate in HK are the formation of CII-HK and the increasing use of quite large teams of academics pooling their different types of expertise in studying specific issues of importance to the community. CII is an association of industry firms and other bodies who contribute annual sums used to fund research . CII puts out research briefs and grants are awarded on a competitive basis. The chosen research ' contractor' and a CII task force formed for each project then coordinate the work. University teams are frequently bidders for CII contracts , and not only for CII contracts . University staff usually know what is going on at the cutting edge of their disciplines anywhere in the world, are skilled in investigative work and reporting and can assemble for debate much relevant information and discussion of the effects of various action scenarios. What to do about the problem of over 10000 privately owned inadequately maintained older multi storey residential buildings was one such study, for example. The academic research team included engineers, social scientists, economists, real estate specialists and law specialists.

Two Examples of Innovation in Hong Kong

Two examples of innovation chosen for this paper are as follows :

1) a cutting edge application of IT power to construction process visual simulation . A technological innovation also affecting working procedures.

2) the innovative formation of an association of construction businesses establishing a mechanism for sharing innovations experiences on actual projects and also of collecting performance measures actually achieved.. An innovation in Industry Culture.

INNOVATION 1. VIRTUAL PROTOTYPING VISUAL SIMULATION

An application of IT power to Construction planning via Visual Simulation.

Introduction

Construction lags manufacturing industry in productivity growth.. For example, in Japan labour productivity in manufacturing improved from 3,531 in 1990 to 5131 (Yen/Man/Hour) in 2004, while that for the construction industry dropped from 3,714 to 2,731 (JFCC 2006

In China, according to Ministry of Construction figures (MOC 2006) labour productivity in manufacturing improved 22% between 2003 and 2006 while construction improved only 0.5%

In the US , since 1964 , the manufacturing industry made steady annual improvements in productivity while the construction industry lost ground and continuously declined.

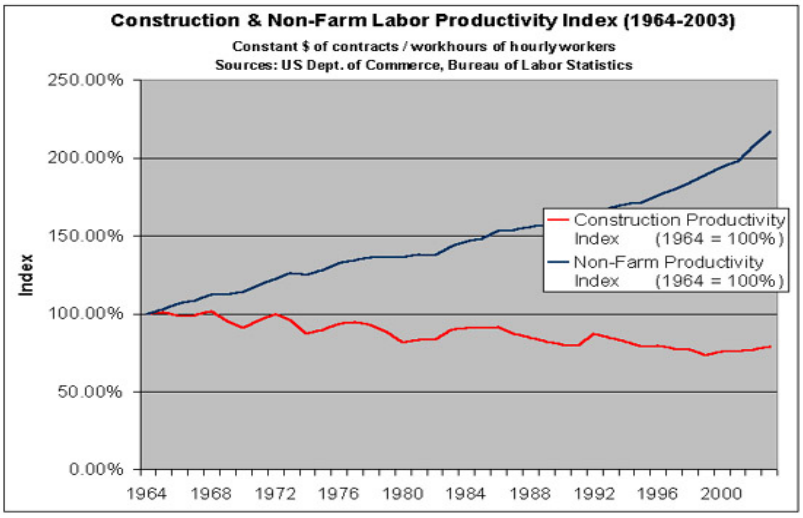

Figure 1: Productivity comparison between construction and manufacturing industries in USA

The reasons must be complex but in Manufacturing the existence of

1. a well defined production line, at the same place, on which products and parts handling processes and logistics occur repetitively over a lengthy period of time;
2. the ability to quantitavely predict risks and errors and
3. the ability to learn from mistakes and to avoid them on the next batch

.

must be important factors. Importantly, also, such long term repeating conditions have justified the expensive investment in powerful visual software for simulating actual

operations, based on three dimensional digital computer modelling of physical entities Such Virtual Prototyping (VP) technology has been extensively and successfully applied in the automobile and aerospace industries (Choi and Chan 2004).

The above three factors do not apply in Construction to any significant degree but the INNOVATION described here, currently being used in Hong Kong, does make use of visual simulation software first developed for the manufacturing industry and now further developed to suit construction processes by Professor Li in the Constructuion Virtual Prototyping Laboratory (CVPL) at the HK Polytechnic Univerity

.

With encouraging results, 7 contractors have used this VP system in Hong Kong in collaboration with the University over the last three years.

VP technology, through simulation in advance of construction, helps the construction industry overcome the second and third of the above weaknesses in construction. Since the construction industry also lacks an effective platform for the capture and re-use of the knowledge distilled from its design and production processes .because project teams are disbanded as soon as projects are completed , VP technology provides an effective platform for capturing and reusing knowledge.

As stated above the CVPL appliesVP technology to real construction in Hong Kong, each time "constructing the building many times" in the computer. All sorts of scenarios can be previewed and potential problems identified in advance. The simulation process visually displays such tasks as the production, transportation, handling and assembly of different construction components. Variables affecting the construction processes, such as site layout, plant locations, machinery performance parameters, quantities of resources, etc., are taken account of when testing the feasibility of proposed construction methods and sequences, and exploring possible solutions and improvements.

In a traditional planning process, planners construct a 3D mental model of the construction project by mentally integrating 2D drawings, CPM based schedules and other information. This is largely an experience based process. More experienced planners construct more comprehensive mental models and generate better construction plans than juniors. The VP technology reduces the need for mental integration and, especially valuable, brings all project participants to a closer level of understanding as to planned activities greatly facilitating effective communication. That project participants can thus evaluate different construction methods and identify possible risks and problems is another key practical benefit.

The Content of a VP Model and its Use in the Planning Process on Site

Project planners must first establish for testing the construction strategy , construction methods and assembly sequences, to allocate the resources required and ultimately to provide daily work instructions for field crews. Fig. 2 outlines the major planning stages and where the VP models on the right are utilised

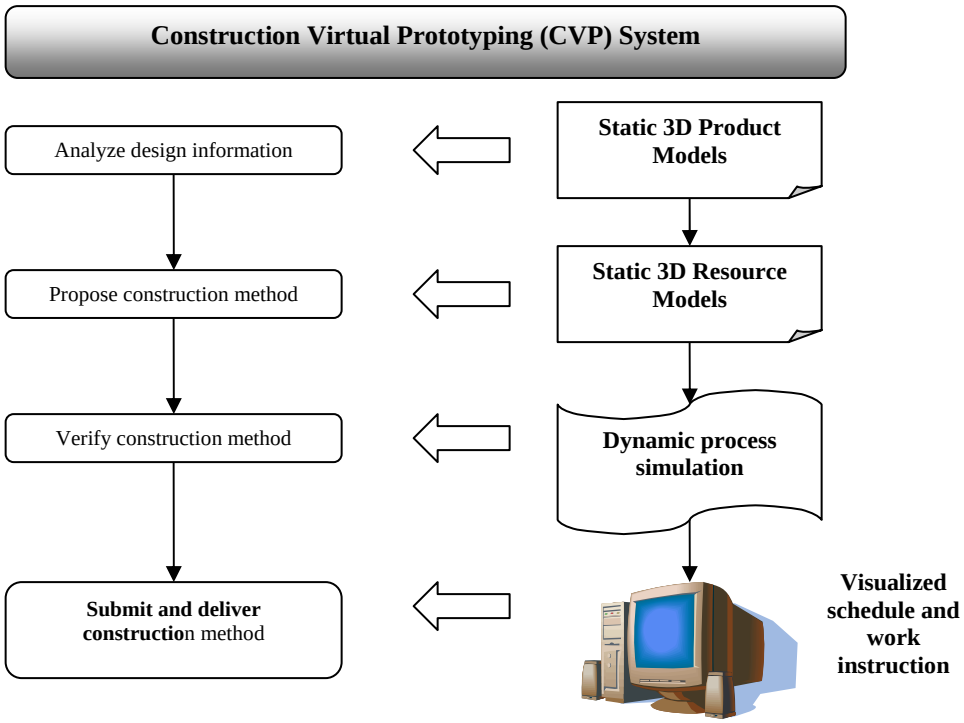

Fig. 2. The process of VP supported construction planning

The Static 3-D Product Model to be constructed is a digital representation of the final building , or 'product', under production.. Constructing these models reveals design errors as the model is entered into the computer, as an assembly of the many components involved. The site plan is also entered at this stage. The latter is needed for planning the allocation of storage space, space for construction operations and site circulation

The Static Resource Models are digital icon representations of plant items and icons for'temporary' items such as equipment excavations and formwork . Construction process sequence information is also included in this model category

The Dynamic Simulation Model accesses the data in the first two models according to a supplied work schedule, to display the construction progress as time is advanced., so-called 4D modeling. Operational sequences are digitally developed and their durations estimated based on plant performance data and available working space.

Since 'a picture is worth more than a thousand words ' communication of intentions to all parties to the contract ,including clients and subcontractors , at levels of scale appropriate to the recipients concerned is both easy and effective, and self consistent to all since everthing comes from the one data base.CVPL experience on the real projects is that the above process does work usefully on site.
Full information for model construction is not always available in the early stages and the content and level of VP model detail varies at different stages to fit management needs.

During the preconstruction stage, a site wide macro planning process involves reviewing potentially suitable construction methods and timings the resources required and plans how site space is to be utilized.. During the construction stage, a micro planning process develops detailed schedules for specific construction operations.

For a full description of the above necessarily brief outline see the paper by Huang et al (2007)

Case Study ---The HO TUNG LAU Project—The Models Involved

This section of the paper relates to an actually constructed project to build a Deck Structure over a railway line. Over about one year the work had to be carried out in short 5 hour bursts and the site cleared and handed back to the railway company each time and strictly on time.. The structure included composite columns, 285T trusses, 100T girders and precast T-beams placed across the girders. The site was restricted and damage had to be avoided to overhead train power lines, their supporting portal frames and a footbridge.

Model content is outlined below. The data listed were entered by the project team to create digital models. A process which occupied about 3 man months.

3D Product Model (after review of drawings)
Individual models for the columns, girders, trusses and precast beams
Model of full assembly of all components (the structure final form)
Component weights, volumes, numbers for analysis purposes
Site model including levels, boundary, adjacent buildings, site entrance, site road and access exclusion zones around permanent railway features.

3D Resource Model (after consideration of possible equipment alternatives)
Construction equipment rough representations for mobile crane, mobile gantry and launching girder. Fig. 3 for the launching girder (bottom left)
Temporary works icons with dimensions.
Possible locations for each type
Planners can review the locations of temporary works

Construction Visualisation
Construction equipment needs for specific components and operating space
Installation procedures for components and installation sequences
Locations of temporary works at different times and space needs.

Fig. 3 illustrates the level of detail used . Zooming facilities exist and the deck detail displayed in the top left figure for instance is still ‘all there’ in the much smaller scale version of the deck in the top right picture. It can be viewed in full detail if needed by zooming in on the image of the deck in that picture.

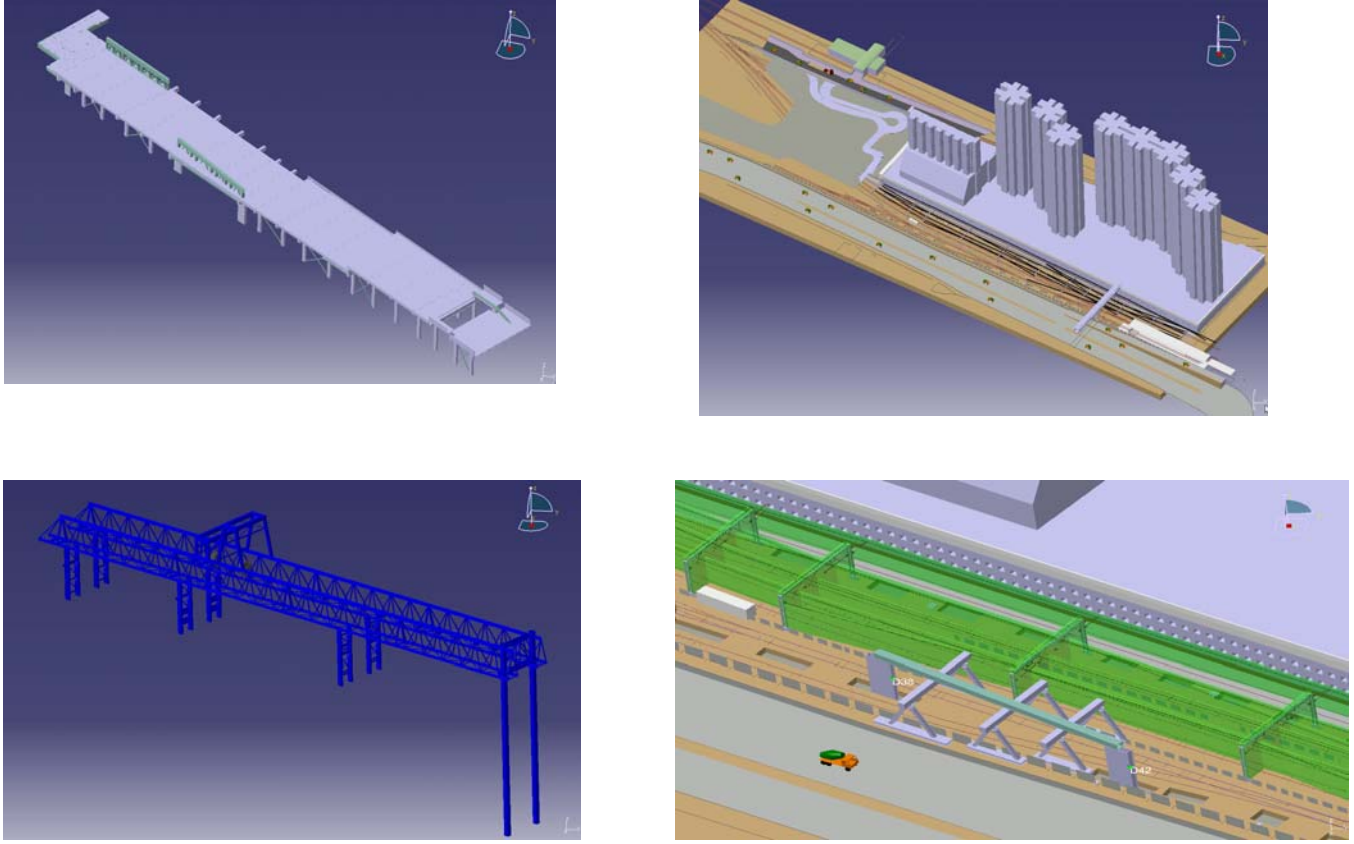

Fig. 3. 3D product and resource models of Ho Tung Lau project

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Method Verification Project

Three methods were simulated (mobile crane, mobile gantry, launching girder) and the pros and cons identified in moving and working the equipment.

The launching girder method was provisionally selected and the planners then had to ensure its smooth operation and non interference with the railway line furniture and the power cable by undertaking detailed, step-by-step, simulation of the construction process. During this simulation, problems were identified and corrective measures taken.

Detailed Simulation and Delivery Instructions

This is the stage of simulating the detailed individual operations and Fig.4 compares the model on the screen with a photograph of the actual operation taking place

.

Further Model data as follows was needed and was input at this stage.

- Operating locations of Equipment
- Sizes and quantities of components
- Temporary works space take up

The simulations include digitally developed activity sequences with durations digitally estimated based on the available working space.

A complex activity sequence for a subcontractor often needs a learning period for field crews. A series of pictures extracted from the VP model was used to give subcontractors and field crews a visualized work instruction (Figure 4). The project team found that the visualized work instruction was understood readily and was more effective than verbal instructions only.

Conclusions

The development and application of VP technology in the construction industry is relatively new.. VP usage can assist planners to eliminate or at least much reduce risk before the commencement of a project. Practical trials on real cases are going well and use of this innovative approach to planning and managing will gradually become mainstream . The investment in personnel to manage the software imposes additional overhead at this stage of development.

The benefits of using VP can be summarized as follows:

The creation, analysis and optimization of construction schedules. Effective constructability analysis. Elimination of risks through digital mockup. Clearer understanding of project scope and clearer instructions to subcontractors. Effective communication for all parties. Effective management of design changes Better capture and reuse of knowledge.

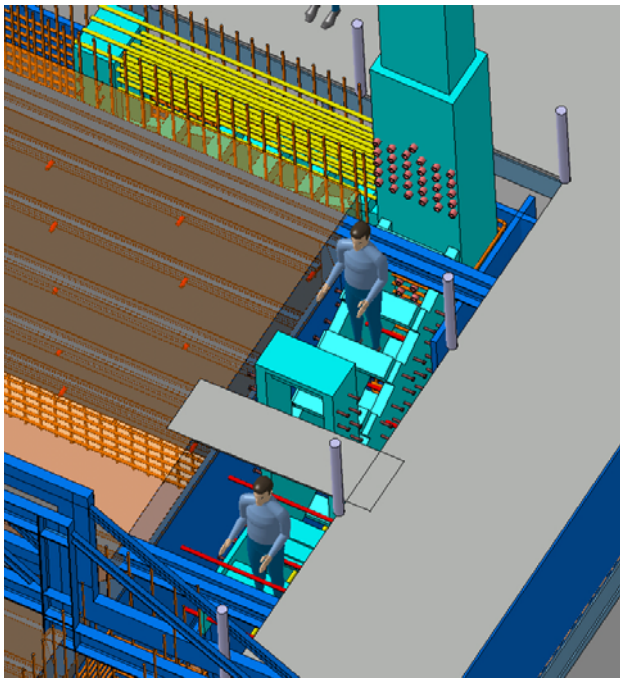

Fig. 4 .Visualized work instruction versus the real installation

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INNOVATION 2. –INNOVATIONS & BENCHMARK BANKS

An innovative model for the sharing of project experiences among construction businesses

The Hong Kong Demonstrations Projects Committee

As a means of bringing about continuous improvement in the construction industry, as demanded by the CIRC report referred to above, a number of construction organizations came together on a voluntary basis . The Hong Kong Demonstration Projects Committee became established in 2003 as a result, as a non-profit making association of construction industry organisations and business units. They agreed to deliberately SHARE their experiences of the use of new technologies and processes and CONTRIBUTE to the building up of performance standards benchmarks which are actually being attained in practice.

There are currently about 30 members , a Coordinator (an Honorary position) , a Group Secretary and a Website Coordinator. Members pay an annual fee. The Chairman is the Chief Executive of one of the largest Hong Kong contractors.

The sharing vehicle used is a Demonstration Projects Website , which is supplemented by newsletters containing extracts from the website in short form for highlighting by circulation.. The aim is to showcase Best Practice and Innovations. So far data relating to 26 projects are shown on the website. They represent private client projects and public projects, inclusive of building and civil engineering works.

The Demonstration Projects Website - www.hkci.org

The website is structured into:

Project Details, including team members and contacts utilized
Key performance indicator measures achieved. (KPIs)
Innovations involved (technological/process)

The KPIs are seen as Benchmarks of Industry performance.. Over time, those good, poor and average performances actually being achieved for particular types of construction activity will become common knowledge (but not names of the stakeholders for good reasons). Thus, rather like the records of sporting performances which are continually being improved, so will construction firms strive to improve on existing benchmarks, setting in motion a process of continuous industry improvement in performance. Nevertheless there is as yet no consensus on how to express KPIs—in what units and what levels of detail. The figures currently being given are valuable in themselves of course, but this is only the necessary start. Added value will appear when, through experience and discussion, there is consensus on the key indicators which should appear on projects and how to measure them. Only then can an industry collectively monitor its

performance standards and pull itself up by its bootstraps sure in the knowledge that the improvement is real and having a measure of that improvement.

The reported innovations, too, effectively form an Innovations Bank providing practical experience data gained with each particular innovation. The existence of this bank will encourage the use of those innovations by others and cut down process learning time and help develop the required innovative culture.
It is not necessary to wait until a project is completed before submitting materials to the website. The Committee welcomes data entries on current projects , which after all can take many years to complete. Entries can then be brought up-to-date from time to time as required..

There is a website editorial panel which vets draft submissions against its established criteria.

Some Examples of Information included on the Website

These samples are included purely for convenience to give an outline flavour of the type and range of content. Readers would get a much better picture by accessing the website directly.

- On a 70-storey prestige building 3D solid modelling for simulation purposes and communication is being integrated with activity planning schedule and costs computer files. A change in any one file is automatically reflected in the other two. This application is very much in line with INNOVATION 1 above, but for a massive project on this scale such software requires three or four people full time for its operation in the service of the construction team.
- Demolition by machines which crush concrete with a 'biting' action reduce noise, dust and allow recycling of the old concrete.. Some of the performance indicators presented show that time and costs of demolition increase by 20% but the acceptable noise radius starts at a distance of only 10m, 99% of the concrete is reusable and the accident rate , in this case at least, was zero .
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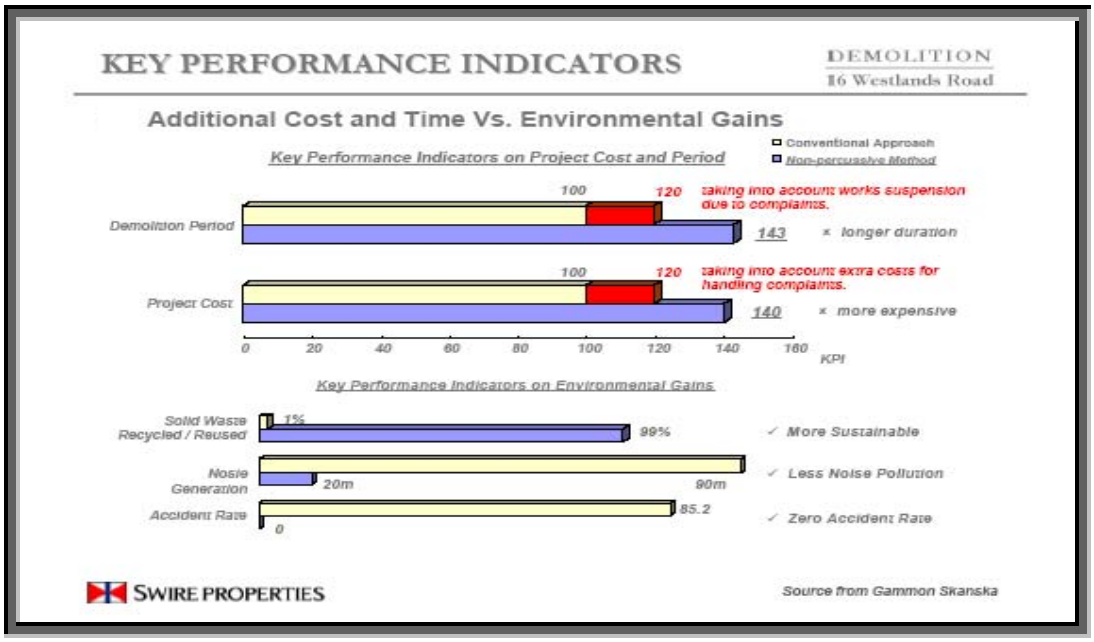
- 

- Source: Benchmark (2006) (Courtesy of Swire Properties)

- Another project presents a submerged pilecap claimed as an innovation in relation to a bridge structure crossing Deep Bay from Hong Kong to mainland China. The purpose is to lessen interference with water flow in the bay.
- A new science park is described for which the opportunity was taken to use advanced materials and methods as a deliberate policy. Such as double skin walls, automatic sun shading devices, special glass low on heat transmission and high on light for example. Modular design philosophy was adopted and much prefabrication of structural and mechanical parts. Formwork and falsework were all recyclable.

Conclusions

The willingness of competing firms to pool data in this way for the benefit of all is particularly interesting and important. It shows that the mood in the industry in Hong Kong is indeed to reach high standards of performance and demonstrates faith in the belief that sharing experiences will lead faster to an improved industry for all.

The development of KPI measures and just what specific KPIs to monitor across all contributors is a challenge being addressed . The importance of getting this right in the interests of most quickly upping average performance standards across the industry is obvious.