

WORKING PAPER on 'KEY PERFORMANCE INDICATORS'

Ci3 India - Action Team 1 – 10 Oct. 2016

1 INTRODUCTION

1.1 BACKGROUND and NEED FOR 'ACTION'

A **Key Performance Indicator (KPI)** has been said to be 'the measure of performance of an activity that is critical to the success of an organisation' (Constructing Excellence, 2016). Taking a broader view, apart from (a) measuring performance of an 'organisation', many take it to also include (b) 'macro' industry wide KPIs (e.g. to track overall productivity, worker health & safety etc.) and (c) 'micro' project performance KPIs (e.g. to evaluate project time and cost performance levels, accident levels etc.).

Construction Industry KPIs are used **less formally** in **many countries** by some e.g. (a) as **industry-wide** thumb-rules e.g., cost/ sq. ft., cost/ km, cost/ MW, cost/ hospital bed, cost/hotel room (grouped under specific categories e.g. affordable housing, 4 star hotels) and (b) possibly **organisation-specific** thumb-rules or **even formal internal benchmarks** based on past project data.

Initial discussions at Ci3 India Roundtables in Oct. 2015 at Chennai and in Feb. 2016 at Mumbai led us to conclude that it would be mutually beneficial to initiate **wider and more structured benchmarking** in India. This could firstly help clients at project level: within a 'Benchmarking club' (starting with a small group and expanding stage-wise); and then later at organisational level (to measure and improve overall organisational performance and resilience); and also at industry-wide / macro level (for example to compare statutory planning and approval time-frames with those in similar countries).

Moreover, while developing India-specific KPIs, we could also benefit from examples and lessons learned from a few countries/ jurisdictions that have developed for example, formal industry-wide Construction Industry KPIs, such as in the UK and in Hong Kong. This is elaborated more in Section 3.2 below.

1.2 PRINCIPAL CONCEPTS UNDERPINNING the ACTION OBJECTIVES

We need '**performance indicators**' to measure performance, along with **norms** and '**benchmarks**' to compare the 'scores' against good practice, and even best practice. From a **management perspective**, some say that "**you can not manage what you can not measure**" or "**we can not improve what we do not measure**".

However, there are obvious **risks** of **relying only** on performance indicators. Choosing an unsuitable set of performance indicators can distort performance because: "**what gets measured and rewarded is what gets done**" (as in the case of the bankers who triggered the 2008 global financial crisis - they got bonuses, but many economies got 'done!'); or worse: "**some things that count can not be counted** while some things **that get counted do not count**"!

Moreover, **one can not measure everything**, and even if we can it may require too much effort to measure some marginally important KPIs. So we need to prioritise and compare the benefits/costs of each KPI. So we must identify a core set of **Key Performance Indicators (KPIs)** for each scenario.

1.3 OBJECTIVES & SCOPE with CURRENT & Potentially Extended COVERAGE

- A. To identify and develop in stages, a set of useful Key Performance Indicators (KPIs) for the Indian Construction Industry;
- B. To first formulate project level KPIs in stages, initially focusing on building construction clients and initially targeting their use by a ‘Benchmarking club’ of leading building construction clients; then having proven their value through pilot-testing with the above, to formulate complementary sets of KPIs for other industry stakeholders (such as contractors) and other industry sub-sectors (such as highways);
- C. To facilitate focused sharing of project information and KPIs*, so as to continuously improve project level performance levels vis-à-vis industry averages; and
- D. To further *extend* the above project level KPIs and formulate, if considered useful after or during the exercises in C above: [i] to organisational KPIs for different types of construction organisations so they may benchmark against organisations of the same type; and [ii] to overall industry level KPIs for the Indian Construction Industry, so as to compare with other countries.

* Note 1: The sharing of project information and KPIs must be carefully regulated, so that confidential data remains confidential. For example; [i] Only benchmarking members’ group averages (and not specific company data) will be available within the group, i.e. to those who have contributed their own required data in well-defined specific areas.; and [ii] secondly it is proposed to set three levels of “willingness to share data” (1) with Public (e.g. on improved Safety statistics, to boost Industry Image); (2) with a Ci3 *India* ‘Benchmarking Club’; (3) for Internal (organizational top management) use only.

Note 2: At this stage, the Ci3 *India* Action Team 1 focused on their brief which was on Objective A in general and specifically on the first part of B only. The other Objectives are suggested for completeness, but are for future consideration. However, it may be noted that there is value in proceeding as soon as possible, to Objective D, since one of us is already in a KPIs task force of an international forum (Global Leadership Forum in Construction Engineering & Management – GLF-CEM) that targets to compare broad overall industry level KPIs across USA, UK, Hong Kong and South Africa to start with, including with India if possible.

2. METHODOLOGY

The methodological approach, along with its basis and justifications will be elaborated further in the forthcoming White Paper. Meanwhile, it may be noted that the core approach was based on: (a) drawing upon international developments of construction industry KPIs in this critical domain; and (b) mobilising high-level experiential knowledge from top management of local building clients to start with: to jointly identify a suite of KPIs that would be most useful for building construction clients in India, while having a potential for comparison with similar endeavours overseas. In this context, referring to the GLF-CEM group referred to in the above para., it may be noted that the South African member of that group expressed considerable interest in eventually developing and comparing project-level KPIs similar to those that we have formulated so far in India.

The methods used were primarily based on literature review and a strong KPIs focus group (Ci3 *India* Action Team 1). The focus group developed the current version of the KPIs template (that will be presented at the October 2016 Roundtables) in stages in Delphi-type progressive cycles, where KPIs were firstly formulated under two different project phases (‘Design’, ‘Construction’) as well as under overall ‘Business

Outcomes’; and also to evaluate different key stake-holders (‘Consultants’, ‘Contractors’); and next short-listed to discard what was less useful and/or where data collection would not justify the benefits.

The above Delphi-type progressive refinements were achieved through a series of pre-programmed of Conference-Calls followed by invited inputs, additional focused literature review and further KPI template developments between the Conference-Calls. The flow chart in **APPENDIX A** summarises the process with major milestones.

3. RESULTS and DISCUSSION

3.1 FINDINGS and OUTCOMES

These are being consolidated so that overall findings and outcomes will be detailed in the forthcoming (follow-up) White Paper. Meanwhile, it may be noted that there is a large gap in some jurisdictions, between the perceived value of KPIs for our industry and indeed top management endorsement of same, *vis a vis* the industry appetite to (a) collect data to populate these KPIs and (b) set up and sustain benchmarking groups to derive the expected value and improved performance levels at project and organisational levels. The foregoing statement is also substantiated by the personal experience of one of the team members related to SMEs in Hong Kong construction and of anecdotal evidence from a similar exercise with large contractors in Australia.

This suggests that special strategies may be needed to ensure that KPI based information collection and sharing would work well in the Indian construction industry. It is believed that the Ci3 *India* core team has the capacities and reach to formulate and implement such workable strategies.

3.2 COMPARISON with other COUNTRIES

We found it useful to source relevant experiences and seek example and outputs from a couple of countries/ jurisdictions that have developed **industry-wide Construction Industry KPIs over the past few years** Focusing **(A)** first on a relatively more recent initiative from Hong Kong and **(B)** next on a more developed KPI regime in the UK:

(A) Hong Kong Construction Industry Performance Reports are published annually in Hong Kong **since 2013** by the Construction Industry Council in Hong Kong. The **first** construction industry performance report in Hong Kong was published in April 2013 and provided an overview of the performance of the Hong Kong Construction Industry in terms of **productivity, health & safety and manpower** over the 11 years from 2001 ~ 2011 (Construction Industry Council, 2013). The second report published in May 2014 provided an overview of the performance of Hong Kong’s construction industry in terms of productivity, health and safety, manpower **and dispute resolution** from 2001 to 2012. The **latest Report** published in 2015 (Construction Industry Council, 2015) provides an industry performance overview **up to 2013** and also includes **environment** KPIs. This also indicates attention on continuously improving the KPIs themselves. Indeed a **review of the KPIs used in Hong Kong in comparison to those used in the UK, Singapore and the USA** was commissioned in 2015 and is being conducted by a team from the University of Hong Kong.

(B) UK Construction KPIs are also published annually, by ‘Constructing Excellence’ which arranges to collect performance data from across the UK construction sector (Constructing Excellence, 2016a).

Note: ‘Constructing Excellence’ is a UK construction industry with member organisations from across the industry **supply chain** - clients, contractors and consultants, suppliers and manufacturers of building materials and components.

It was set up in 2003, combining many precursor organisations, to take forward co-ordinated applications of recommended principles and practices from the 1994 Latham and 1998 Egan Construction Industry Reports.

UK KPIs are more detailed than Hong Kong (Constructing Excellence, 2016b) and track changes from 2003 in most cases, and even from 1999 for some 'Economic KPIs' and from 2002 for 'Construction Consultant KPIs' (the latter interestingly being on 4 dimensions of Client satisfaction with Consultants' performance).

A **KPIzone** suite of products under the Constructing Excellence umbrella, provide organisations of any size and from all sectors of the construction industry with an easy way of measuring and benchmarking performance against national data.

Mainly, the **KPI Engine** "allows you to benchmark your company and project performance against the UK construction industry KPIs and, additionally, allows you to access a more sophisticated set of benchmarking and reporting options such as comparing your performance over time, between projects and against averages. You can also have bespoke KPIs developed for your specific needs. The **KPI Engine** can be used to run Benchmarking Clubs, manage frameworks, for work allocation and incentivised contracts. Note - A login for the KPI Engine was said to cost GBP 395 + VAT." (BRE, 2016)

However, you may access a free demonstration of the engine, using '**demo**' as a login and password (BRE, 2016). **Also, as stated in BRE (2016 :**

"Performance measurement demonstrates whether you're achieving continuous improvement. But particularly when you're new to measurement, it can be hard to know whether the scores you're achieving are any good or not. How do you compare to the rest of the industry or your direct competitors? The KPI Engine provides comprehensive support for collecting, reporting and analysing data. **The KPI Engine allows you to:**

- Identify your own suite of KPIs from over 200 different measures
- Include bespoke KPIs
- Report KPI scores easily in tables, graphs and action plans
- Allows you to benchmark projects and the company against a range of data sets.

Sample KPI's

- Client Satisfaction
- Defects
- Construction Time & Cost
- Productivity
- Profitability
- H&S
- Employee Satisfaction
- Staff Turnover
- Sickness Absence
- Working Hours
- Qualifications & Skills
- Impact on Environment
- Whole Life Performance
- Waste

EXAMPLES of KPIs from UK and Hong Kong:

[1] see **APPENDIX B** for Samples, while

[2] you may access the last reported Full Range - (2A) from **the UK** through:

https://www.glenigan.com/sites/default/files/UK_Industry_Performance_Report_2015_883.pdf

as well as (2B) from **Hong Kong**

3.3 KPI TEMPLATE for BUILDING CLIENTS in INDIA

This was developed as outlined in the Methodology section above.

Please see **APPENDIX C** for the interim version. We have retained columns 4, 5 and 6 in case any Ci3 *India* Team members (outside Action Team 1 on KPIs) also wish to make suggestions on the derived KPI set. We do acknowledge that it is still a large set that could benefit from more shortlisting.

On the other hand it could be seen as a base set of KPIs from which each organisation could choose a sub-set that suits their objectives and priorities, bearing in mind that there should be a critical mass of clients choosing any particular KPIs that could be benchmarked.

Columns 7 and 8 of the template, will need to be populated at the next stage with more intensive inputs to design realistic 'weighting indicators' in column 7 and more 'extensive' as well as focused industry participation to collect data for and determine typical (e.g. average) value ranges for column 8.

4. WAY FORWARD and FUTURE WORK with POINTERS

This should be best discussed after receiving inputs from other Ci3 *India* members at the two Roundtables in October 2016.

To start this discussion on the 'Way Forward', we propose that we should (A) set up a 'Core Benchmarking Group', so as to (B) invite their inputs to populate Columns 7 and 8 of the KPI template as soon as possible, so that our interim output in Appendix C can be transformed into a viable and useful working document.

The Action Team would need to be expanded and resources need to be provided for data collection and analysis. The way forward and the extent of future work would of course depend on these, while it could be targeted in specific packages to be done in stages.

POINTERS:

It is important to identify the 'right' set of KPIs for each scenario, lest we distort performance by setting 'wrong'/ misleading targets that increase specific outputs, rather than overall outcomes. Different sets of KPIs need to be designed for different purposes, and also under different categories, e.g.:

- A. for the whole Construction **Industry**; or for **Organisations**; or for **Projects**
- B. for different types of Construction Industry Organisations – Clients, Consultants, Contractors ..
- C. for different types of Construction Projects
- D. at different levels of detail: Primary (e.g. 'Headline Indicators' for Top Management); Secondary (for middle management or medium term control); Tertiary (for day-to-day control)
- E. More Indicators **if** drilling into details – (Kumaraswamy and Thorpe, 1996a) – when using such a family of indicators, *if* a top tier indicator rings alarm bells, being well below the 'norm' or 'deviant', *then* a manager may decide to also probe the level below and even drill further until the root causes of the problems are unearthed.

KPIs enables us to know where we were and where we are now, as well as to target where we want to go and to track our progress as we get there.

We must identify success criteria (and sub-criteria) and indicators (KPIs) to measure them and target values/ranges (Kumarawamy and Thorpe, 1996a)

But can everything be measured/ quantified? Some assessments will always be subjective. But we can use techniques and tools such as 'pairwise comparisons' to reduce subjectivity (Kumarawamy and Thorpe, 1996b)

5. CONCLUSIONS

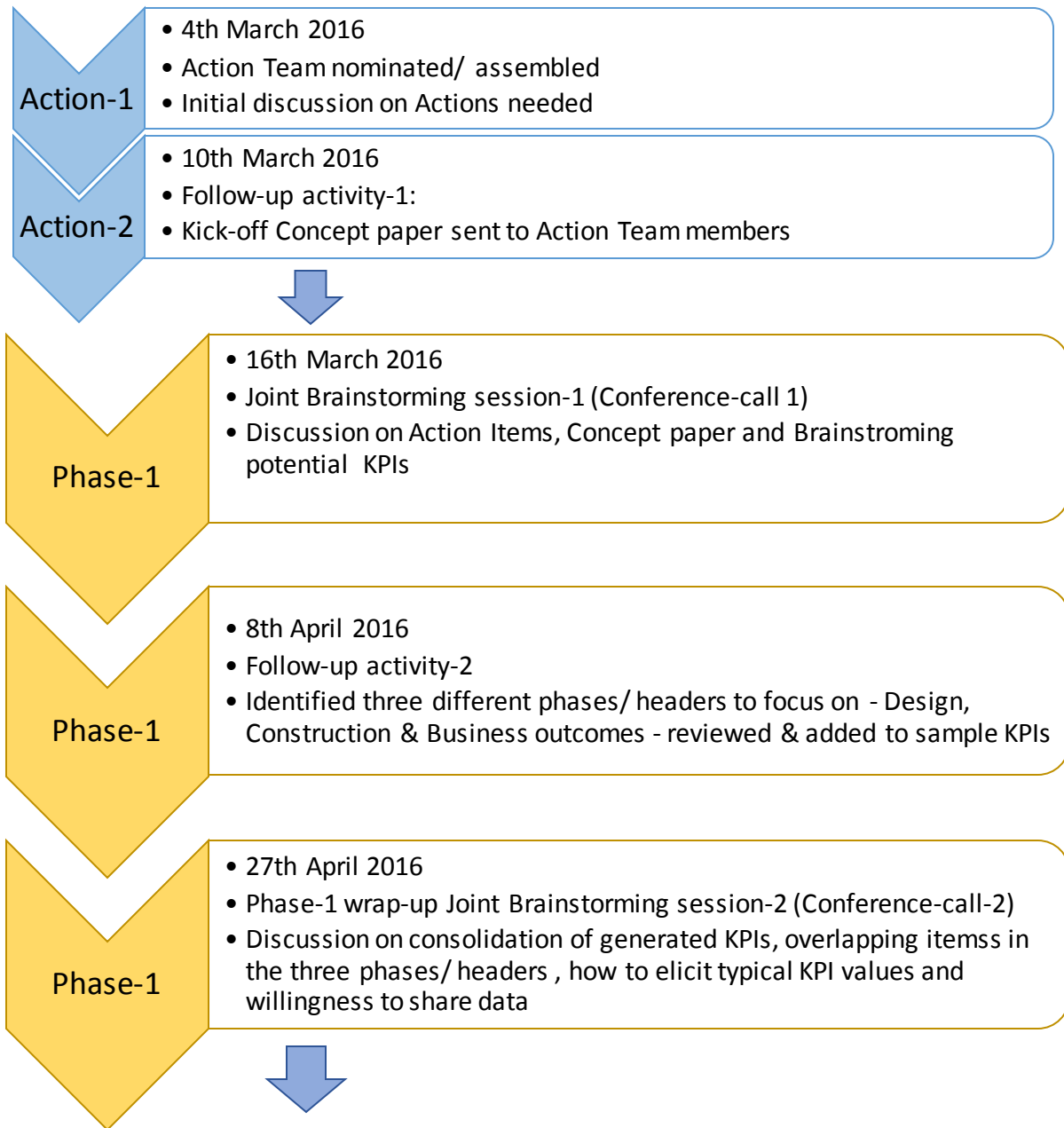
The Conclusions and Recommendations can be best finalised after receiving inputs from other Ci3 *India* members at the two Roundtables in October 2016. Meanwhile, the significance of this area and of the interim outputs would be evidenced in the above sections. The limitations in collecting, sharing and making sense of the data can not be belittled. However, we can learn some lessons from similar experiences in other countries and translate them to our context in taking setting focused strategies with specific safeguards, checks and balances.

6. REFERENCES

- BRE (2016) Building Research Establishment and University of Salford CCI, UK, <https://www.bre.co.uk/page.jsp?id=1478>, accessed 08 March 2016
- Constructing Excellence (2016a), Constructing Excellence UK, <http://constructingexcellence.org.uk/kpis-and-benchmarking/> accessed 09 Oct. 2016
- Constructing Excellence (2016b) UK Industry Performance Report 2015 – based on the UK Construction Industry Key Performance Indicators, accessed 09 Oct. 2016
https://www.glenigan.com/sites/default/files/UK_Industry_Performance_Report_2015_883.pdf
- Construction Industry Council (2015), Hong Kong Construction Industry Performance Report for 2013, Hong Kong, accessed 09 Oct. 2016
[https://www.cic.hk/cic_data/pdf/research_and_data_analytics/industry_performance_report/eng/KPI%20Report%20for%202013%20\(English\).pdf](https://www.cic.hk/cic_data/pdf/research_and_data_analytics/industry_performance_report/eng/KPI%20Report%20for%202013%20(English).pdf)
- Construction Industry Council (2013), Hong Kong Construction Industry Performance Report for 2011, Hong Kong, accessed 09 Oct. 2016.
[https://www.cic.hk/cic_data/pdf/research_and_data_analytics/industry_performance_report/eng/HKConstructionIndustryPerformanceReportfor2011\(20130418\)\(English\).pdf](https://www.cic.hk/cic_data/pdf/research_and_data_analytics/industry_performance_report/eng/HKConstructionIndustryPerformanceReportfor2011(20130418)(English).pdf)
- Kumaraswamy, M.M. and Thorpe, A. (1996a) 'A Computerised Construction Project Management Evaluation System', Journal of 'Advances in Engineering Software', Elsevier Science, Vol. 25, No. 2/3, pp. 197-206.
- Kumaraswamy, M.M. and Thorpe, A. (1996b) 'Systematizing Construction Project Evaluations', American Society of Civil Engineers Journal of Management in Engineering, Vol. 12, No. 1, Jan./ Feb. 1996, pp. 34-39.

APPENDIX A – Action Team 1 on KPIs - ACTIONS FLOWCHART (Mar.-Aug. 2016)

The flowchart below shows the principal actions and time-line with milestones of Ci3 India Action Team 1 after it was assembled in March 2016.



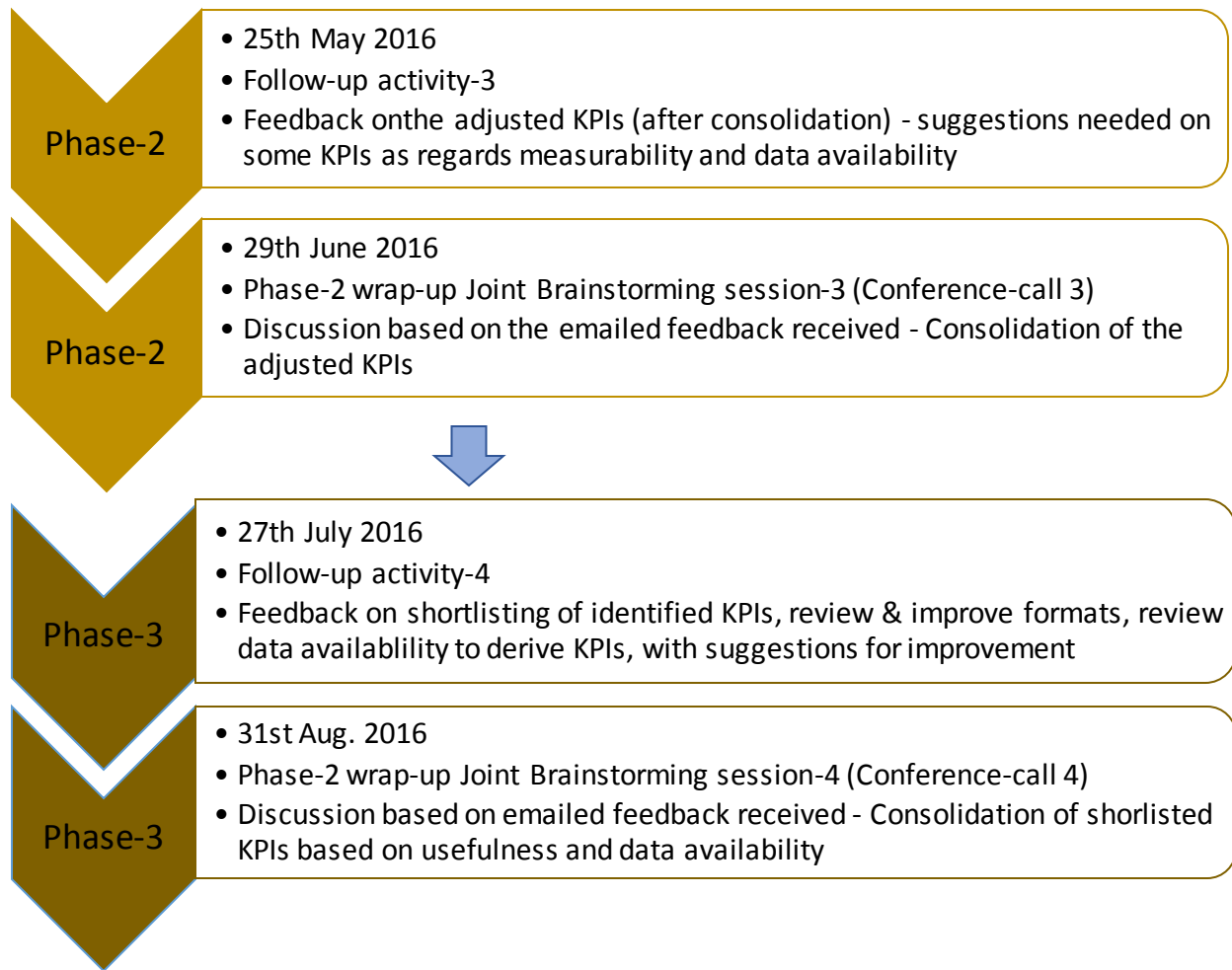


Fig. 1. R&D Actions flowchart of Ci3 *India* Action Team 1 on KPIs

APPENDIX B – Samples of KPIs from Hong Kong and UK:

(1) Examples from Hong Kong

from Hong Kong Construction Industry Performance Reports – compiled & issued annually
by Construction Industry Council in collaboration with Rider Levett Bucknall Limited

- 2013 report available on CIC web-site

5 AREAS	4 CATEGORIES	2 SECTORS
• Productivity (7 KPIs)	• Whole Industry	
• Health & Safety (3 KPIs)	• Civil Engineering Works	• PUBLIC
• Environment (3 KPIs)	• New Building Works	• PRIVATE
• Manpower (3 KPIs)	• RMAA* Works	
• Dispute Resolution (3 KPIs)	* Repairs, Maintenance, Additions, Alterations	

- **REVIEW** commissioned by **CIC** – awarded to **HKU CICID*** - consultancy to review
“Consultancy Services for **Assessing the Performance of the Hong Kong Construction Industry, Key Performance Indicators (KPI): An International Comparison**”

* **Centre for Innovation in Construction and Infrastructure Development**

Extract: HONG KONG Headline KPIs (Separately for each Category and Sector)

KPIs	DEFINITION
P1	(On site) Man-days per HK\$1,000,000 gross value of construction works [PRODUCTIVITY KPI]
P2	(On site) Man-days per gross floor area [PRODUCTIVITY KPI]
P3	Construction cost Indices [KPI of COST TREND OF CONSTRUCTION WORKS]
P4	Percentage of gross value of construction works to GDP [KPI OF THE ECONOMIC SIGNIFICANCE OF THE CONSTRUCTION INDUSTRY]
P4a	Percentage contribution of construction activities to GDP at basic prices [KPI OF THE ECONOMIC SIGNIFICANCE OF THE CONSTRUCTION INDUSTRY]
P5	Gross value of construction works per capita [PRODUCTIVITY KPI]
P6	Number of manual workers engaged per HK\$1,000,000 gross value of construction works at construction sites [PRODUCTIVITY KPI]
P7	Number of manual workers engaged per 1,000 sq. m. gross floor area [PRODUCTIVITY KPI]
HS1	Industrial accident number / rate (reportable industrial accidents per 1,000 manual workers) [KPI OF SAFETY PERFORMANCE]
....

APPENDIX B – Samples of KPIs from Hong Kong and UK: (2) Examples from UK

UK Construction Industry Performance Report 2015 – based on UK Construction Industry KPIs

Broad Groups of KPIs:

	ECONOMIC KPIs – All Construction	MEASURE
• Economic Indicators →	Client Satisfaction - Product	% scoring 8/10 or better
• Client Satisfaction	Client Satisfaction - Service	% scoring 8/10 or better
• Contractor Satisfaction	Client Satisfaction - Value for Money	% scoring 8/10 or better
• Profitability	Contractor Satisfaction	% scoring 8/10 or better
• Predictability	- Performance - Overall	
• Respect for People	Contractor Satisfaction	% scoring 8/10 or better
• Environmental Indicators	- Provision of Information - Overall	
• Housing	Contractor Satisfaction - Payment - Overall	% scoring 8/10 or better
• Non-Housing	Defects - Impact at Handover	% scoring 8/10 or better
• Consultants	Predictability Cost - Project	% on cost or better
	Predictability Cost - Design	% on cost or better
	Predictability Cost - Construction	% on cost or better
	Predictability Time - Project	% on time or better
	Predictability Time - Design	% on time or better
	Predictability Time - Construction	% on time or better
	Profitability (Return on Sales)	Median % profit before interest & tax
VAPE – Value Added per Employee:	Productivity (VAPE Current Values)	Median value added/ FTE employee (£000)
	Productivity (VAPE Constant 2011 Values)	Median value added/ FTE employee (£000)

Note – 2015 Report gives % figures for years from 1999 (or 20012/ 2003) to 2015
+ Trend (vs. 'Last Year' and 'All Years')

3

Realistic & Robust KPIs? – More [Examples from UK](#)

Similar tabulated Breakdowns of:

Economic KPIs - All Housing

Economic KPIs - All Non-Housing

AND

Respect for People KPIs - All Construction

Environment KPIs - All Construction

Construction Consultant KPIs

Some Highlights from 2015 Report

60% of construction projects are completed **late**. (Note: 55% in 2014, so worse in 2015)
Better on 'Cost Predictability' – on or within budget on 69%

In Non-housing - **design phase** on time in 52% projects; **construction phase** in 45%

Client satisfaction with overall product has fallen three years in a row to 81%

“Overall ...seems construction is making limited progress towards government's
Construction 2025 performance targets

- aim to cut delivery time by 50% and reduce costs by 33%.

4