

# ***DRAFT WHITE PAPER on 'KEY PERFORMANCE INDICATORS'***

- *Ci3 (Construction Industry Institute India) Action Team 1 - January 2017*

[Note: **Ci3** (Construction Industry Institute India) replaces Ci3 *India* (Construction Industry Initiative *India*)]

## **1 INTRODUCTION**

### **1.1 BACKGROUND & 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 also (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 to a conclusion that it would be mutually beneficial to initiate *wider and more structured benchmarking* in India. This could firstly help clients at project level: to compare performance levels against past data and also across different ongoing projects; as well as at organisational level (to measure and improve overall organisational performance and resilience); which could also lead to a 'Benchmarking club' comparing a few selected KPIs (starting with a small 'club membership' and a few 'mutually beneficial' KPIs, but expanding in steps); and also at industry-wide / macro level (for example to compare statutory planning and approval time-frames with those in similar countries, accident statistics etc.).

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 expanded upon in Section 3.2 below.

### **1.2 PRINCIPAL CONCEPTS UNDERPINNING 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 AIM, OBJECTIVES, SCOPE, CURRENT & ENVISAGED FUTURE COVERAGE**

**AIM:** To identify and develop in stages, a set of useful Key Performance Indicators (KPIs) for the Indian Construction Industry.

#### **OBJECTIVES:**

- A. To first formulate *project level KPIs* in stages, for building construction clients, for their own internal use, as well as for 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);
- B. To facilitate focused sharing of project information and KPIs\*, so as to continuously improve project level performance levels *vis-à-vis* industry averages; and
- C. To further *extend* the above project level KPIs and formulate, if considered useful after or during the exercises in B 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 ‘Benchmarking Club’; (3) for Internal (organizational top management) use only.

Note 2: At the initial stage, the Ci3 *India* Action Team 1 focused on their brief which was on the first part of Objective A. The rest of Objective A and the other Objectives are shown so as to indicate the overall strategy. Indeed, there is value in proceeding as soon as possible, to Objective C, since a Ci3 Action Team 1 member is already in a KPI 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 strategy was devised to (a) draw on thumb-rules and other experience-based measures that reflect KPIs already used by some clients worldwide; (b) borrow ideas from the relevant literature; and (c) develop new KPIs to bridge the gaps where important performance parameters ‘escape’ evaluation. Based on this, the core methodological approach: (i) draws upon international developments of construction industry KPIs in this critical domain; and (ii) mobilises 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 paragraph, 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, while many industry level KPIs are already publicly available in the UK and Hong Kong.

The methods used were primarily based on literature review and the experiential knowledge of a strong KPIs focus group (Ci3 *India* Action Team 1). The focus group developed a KPIs template that was presented with a Working Paper at the two October 2016 Roundtables. This KPIs template was developed 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 ('Clients', 'Consultants', 'Contractors'); and next short-listed to discard what was less useful and/or where difficulties in data collection would not justify the benefits.

Following the initial draft by a core Team member and inputs by another based on the literature and experiential knowledge, the above Delphi-type progressive refinements were achieved through a series of email invitations to provide feedback comments and suggest changes. These were followed by Conference-Calls, in turn followed by further exercises to develop specific parts of the progressive drafts, additional focused literature review and further KPI template developments between the Conference-Calls. This 'base development' was carried out in three phases as in the flow chart in APPENDIX 1.1.

Based on feedback at the morning plenary session of the Ci3 *India* Consolidation Roundtable on 19 Oct. 2016, it was decided at the afternoon Action Team 1 brainstorming session, to further reduce the numbers of KPIs. Secondly, it was decided to present them in three different categories (at three different levels) – (1) directly for internal use by an organisation on a project, or to compare projects within an organisation; (2) deriving 'averages' for an organisation and comparing with those of others who join a 'benchmarking club' for this purpose; and (3) at industry level, to track changes over time, e.g. on accidents or manpower productivity statistics and/or to compare these with other countries.

To implement the above decisions, shortlisting and refining the KPIs in each of the above three categories/levels was undertaken by an appropriate Team member. Their outputs were discussed at a core team brainstorming conference call on 10 Nov. 2016. Thereafter, another 2 core team members independently checked and refined the above KPIs in stages and developed these at three subsequent focused one-on-one discussions as in APPENDIX 1.1.

### **3. RESULTS and DISCUSSION**

#### **3.1 FINDINGS AND OUTCOMES**

The principal Ci3 Action Team 1 interim output that was developed using the above methodology, is in APPENDIX 1.2A as the 'Suggested KPIs' for Building Clients in India. Organisations can choose from this suite of KPIs from different groups (i.e. design phase, construction phase, or business outcomes) at different levels or categories (i.e. project/organisation level, or benchmarking club level) and use to benchmark internally over time or across projects and/or with other organisations, or even modify before using internally, if felt necessary. Of course, if some KPIs are modified by an organisation, these modified versions can not be benchmarked with others, unless all benchmarking club members use the same modified format.

As seen in APPENDIX 1.2A, columns F, G and H that were used during development, are retained in case any users wish to make suggestions on the basic or core KPI set. This should 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 I and J of the template, will need to be populated at the next stage with more intensive inputs to design realistic 'weighting indicators' that will help allow for special conditions by adjusting a typical KPI value accordingly in column I; and more 'extensive' as well as focused industry participation to collect data for and determine typical (e.g. average) value ranges under 'normal' conditions for column J. Note: APPENDIX 1.2B is a truncated version of APPENDIX 1.2A, where the last few columns are omitted so that the first few columns are more legible.

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 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] **APPENDIX 1.3** contains Samples, while

[2] one 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](https://www.glenigan.com/sites/default/files/UK_Industry_Performance_Report_2015_883.pdf)

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

[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)

**3.3 SUGGESTED WAYS FORWARD AND FUTURE WORK WITH POINTERS**

As discussed at the two Roundtables in October 2016, it is proposed to (A) set up a ‘Core Benchmarking Group’, so as to (B) invite their inputs to populate Columns I and J of the KPI template as soon as possible, so that our interim output in APPENDIX 1.2A and APPENDIX 1.2B 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 and to be done in stages.

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).

#### 4. CONCLUSIONS

The interim conclusions are essentially encapsulated in the basic KPI template in APPENDIX 1.2A. However they need validation and quantification. So it is recommended to disseminate these widely to solicit inputs from industry at large on the potential usefulness of the proposed KPIs. Meanwhile, data should be collected and analysed on selected KPIs so as to populate column J with ‘typical value ranges’, while parallel R&D exercises could work out the composition and scale of ‘weighting indicators’ by which to adjust such values for particular conditions. 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 when formulating focused strategies with specific safeguards, checks and balances. It should also be reiterated that what is presented in the basic KPI template are a suggested suite of KPIs from which each organisation may choose what suits their priorities, while they may of course add any others that are organisation-specific.

In summary, after inserting typical values and weighting indicators, the suggested suite of KPIs for Building Clients in India would enable organisations to choose: (1) from three different groups (i.e., design phase, construction phase, or business outcomes); and (2) at three different levels (i.e., project/organisation level, benchmarking club level, or industry level). They could then use the chosen KPIs to benchmark internally over time or across their projects and/or with other organisations. Such self-evaluation exercises should help drive performance improvements at project, organisational and industry levels. Furthermore, since we should be targeting integrated collective improvements, this approach and methodology could be extended to other construction industry sub-sectors and stakeholders as indicated in sub-section 3.3 above, e.g. to roadworks and contractors.

#### 5. 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](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', 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.

## **6. Ci3 ACTION TEAM 1 MEMBERS:**

Dr. Gangadhar Mahesh (NIT Surathkal) - *Lead 'Drafter' of KPIs*

Mr Thirumanan (Brigade) - *special inputs on Construction Phase KPIs*

Mr Shabbir Kanchawala (K Raheja Corp.) - *special inputs on Design Phase KPIs*

Mr. Tamil Selvan (TVS) - *special inputs on Business Outcomes KPIs*

Mr. Santhosh Loganathan (IITM)

Mr. Chandramouli (TVS)

Mr. Sanjay Ubale (TRIL)

Mr. Kekoo Colah (SP)

Mr. Kishore Bhatija (K. Raheja Corp.)

Mr. Prakash Patil (TRIL)

Mr Hari Govind (TRIL)

Mr. S. Hari (Jones Lang LaSalle)

Dr. Venkata Delhi (IITB)

Prof. Mohan Kumaraswamy (IITM) – *Co-ordinator of KPIs & White Paper*