

White Paper 2021-03

What Are Key Project Control Performance Indicators for EPC projects

With the objective to properly control integrated EPC projects, adequate Key Performance Indicators need to be computed and followed by Project Control to monitor the effective performance of the project. In this White Paper we will describe which key indicators we believe should be tracked, with a specific focus on transverse indicators across disciplines.

When it comes to EPC projects, beyond KPIs that are specific to a particular discipline such as productivity measurements or progress measurements, transverse KPIs are useful to understand the actual overall performance of the project as a whole. Such KPIs can be classified in 3 categories:

- KPIs transverse to several project control disciplines (cost, schedule & risk),
- KPIs transverse to several E-P-C-C chain disciplines (engineering, procurement, construction, commissioning),
- KPIs that are early indicators of performance issues.

Those KPIs are not complicated. However, they may not be straightforward to measure if the project setup has not accounted properly for the need to measure them, for example in terms of data coding to cross data from several sources in order to produce them at the required level of breakdown, or in terms of system in place to capture the specific data at project level.

KPIs transverse to Project Control disciplines

Key indicators rely on the comparison of information from various project control disciplines.

- **Earned value and associated productivity factors** result from the comparison of cost and physical progress data at various breakdown levels. It is by crossing this information that useful productivity ratios are derived – for those activities that are relevant, such as engineering and construction.
- **The comparison of physical progress and cost progress** is a useful KPI on the health of the cost control process. Normally physical progress measurement is rather on the optimistic side, therefore physical progress can be expected to be higher than the cost progress (actual cost / forecast at completion). The difference should be on the order of 5 to 10 percentage points, depending on the actual optimism of physical progress measurement rules. A substantially different ratio (for example a cost progress above the physical progress, or substantially lower than the physical progress) should lead to an investigation of the reasons for this discrepancy.
- **Checking whether risk mitigation actions have effectively been costed in the project forecast.** Risk mitigation actions are actions that are due to be

taken and should therefore be included in the forecast. Very often, the project risk process runs so independently that the risk mitigation actions are forgotten and can't be implemented because of the lack of budget.

KPIs implying consequential impact between EPCC disciplines

The following indicators are representative of substantial consequential impact along the EPCC chain and warrant to be followed:

- **Quantities of main key material** (e.g. weight of steel, inch diameter of pipe welding, volume of concrete – it depends on the industry and project). They are useful to monitor in particular during the various stages of engineering to check that the quantities remain within the usual growth allowances. Any unchecked growth of main quantities will have substantial consequences on the entire procurement, construction and commissioning costs and schedules; and even possibly on the actual concept if it sensitive to the weight factor. Weight control and tracking is an absolute must-KPI for all EPC projects. Weight and forecast quantities must be reported systematically as part of the overall project performance report (these KPIs are often neglected while they could explain most of the underlying growth of schedule and cost).
- **Number of Changes managed through the Management of Change process(es).** A high number of substantial changes, and/or changes arising in later stages of project execution is a sure indicator of future performance issues of the EPC project
- **Number of revisions of AFC documents.** A high number of document revisions in Approved for Construction status shows both that the initial approval of documents does not have the expected quality, that there may be changes that are implemented without having been properly identified, and also that engineering effort and schedule to bring all documents to their final stage are grossly under-estimated. It is somewhat redundant with the tracker for Management of Change but is an alternate to capture poor Management of Change process and inadequate quality of engineering.

Key indicators provide clear, straightforward indications on the actual health of an EPC project with a focus on consequential impacts throughout the entire EPCC chain.

Early warning indicators KPIs for EPC projects

The following indicators have proven to be useful early warning signals and warrant to be followed:

- **Contingency utilisation.** In industrial projects most of the risk is in the last phases of construction and commissioning. Therefore, early usage of substantial amounts of contingency is the sign that the risk governance process is not operating properly (allowing the release of contingency to compensate for extra costs irrespective of the residual project risk). Unless there is a specific reason for this behaviour, excessive early utilisation implies an unchecked trend of the project towards a cost overrun, that is hidden because it is temporarily compensated by contingency money. It is liable to blow up as soon as the contingency will be exhausted, while actions should be taken immediately to recover from excess cost.
- **Airfreight costs.** They are an excellent indicator of excessive delays in engineering and procurement since most projects do not consider airfreight as part of their baseline execution plan. The appearance of such costs (or any expected rental of an Antonov cargo plane!) is a sure indicator of substantial delays that may impact the construction schedule
- **Ratio of prepared available work packs for construction and commissioning.** It is essential not to have the construction site on standby for the lack of material or engineering data. Therefore, there should always be some work packages prepared in advance including the necessary shop drawings and associated material. This will also allow the construction site to divert resources in case of unexpected issue on the planned activities. Thus, having a tracking of the buffer of prepared work packages is a useful indication of how close the construction site can be of being on standby. The same applies to commissioning, to ensure there is no standby at that stage.

When it comes to EPC projects, beyond KPIs that are specific to a particular discipline such as productivity measurements or progress measurements, transverse KPIs are useful to understand the actual overall performance of the project as a whole.

Conclusion

The few KPIs described in this White Paper are easy to implement and track, at various breakdown levels – provided their production has been anticipated in the data structures and data gathering processes. They give clear, straightforward indications on the actual health of an EPC project with a focus on consequential impacts throughout the entire EPCC chain. Most can be expected to be systematically reported in project performance reports.



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