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Production Control

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Construction project management has traditionally had a project orientation. Reflecting this, project performance measures used by the sector have focused on project level outcomes rather than on processes and generally, there has been a tendency to measure these at the end of projects, well after the events that they record. Performance assessment has been largely limited to simplistic comparisons between the planned and actual time and expenditure, and compliance of statutory requirements or contractual obligations for record keeping where such requirements existed. The consequence of this has been that feedback generated through these measures has had little impact on the outcomes of the current project being measured; rather they have influenced practice and policies on future projects.

Since 1990, generally as a result of Government led industry development initiatives, an input based management approach has become widely accepted. Under this approach, mandated inputs such as formal plans (quality, safety and environmental plans), management processes (site safety walks and meetings), communication (toolbox meetings) and training (safety inductions at the workplace and industry level) have been adopted. Reflecting this philosophy new performance measures reporting on the level of inputs have become relatively common. This approach is predicated on a belief that there is a direct relationship between inputs and outputs.

However by the end of the twentieth century this implied relationship between inputs and outcomes was being questioned (Karim and Marosszeky, 1999), especially in the area of quality management where it had been shown that the mandated adoption of ISO9000 in its earlier form did not lead to improvements in product quality. Furthermore, while traditional lag indicators are useful in monitoring the end result of a project, they fail to actually identify those weaknesses within the system that need to be modified in order to achieve improvement, nor do they of themselves directly stimulate improvement.

In the UK, where a series of government initiatives for industry development (Latham; Egan and most recently Rogers) have been designed to drive industry improvement, high level performance indicators for industry benchmarking have been developed (HMSO 1998). These include, among others, safety (accidents) and defects at the time of handover to clients (www.cbpp.org.uk). However it is noteworthy that these applications are nearly all enterprise and project based and not focused on process improvement.

Although Alfed (1988) was perhaps one of the first to argue for better measures of performance in the construction industry, the process gathered

momentum in the mid 1990s (O'Conner and Miller 1994; Ballard and Howell, 1997; Fisher et al. 1995; Mohamed 1996, Karim and Marosszeky, 1999, Trethewy et al,1999b; Marosszeky *et al*, 2002; Formosa *et al*, 2002).

In summary, the limitations of traditional project level performance assessment, input based assessments and enterprise level measures are that none of these focus at the process level and none have the capacity to directly drive process improvement.

Recent research in construction has shifted the focus to process control (Ballard and Howell, 1997; Trethewy et al,1999b; Marosszeky *et al*, 2002; Formosa *et al*, 2002) from the complementary perspectives of production, safety and quality. These have addressed the performance of management processes as well as related outcomes during a project. In a recent paper (Karim et al, 2003) a framework has been developed to address three complementary issues - management ***system compliance***, ***management response*** to identified problems and deviations from process plans and finally, ***process outcomes***.

The more detailed approach to process related performance assessment, feedback and improvement in this recent work provides a new basis for process improvement at the detailed level.

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