

THE INFLUENCE OF A PROJECT PERFORMANCE MEASUREMENT SYSTEM ON THE SUCCESS OF A CONTRACT FOR MAINTAINING MOTORWAYS AND TRUNK ROADS

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ABSTRACT

This paper reports the attitudes and experiences of project stakeholders working on a contract in the United Kingdom (UK) for the Highways Agency (HA). The agency used these stakeholders to procure construction services for maintaining its roads. During the course of the project, the HA changed its focus from a traditional, compulsory competitive tendering-type (CCT) strategy to one based on the HA's Construction Management Pilot (CMP) scheme. Part of the change involved the HA's introduction of a performance management system (PMS); this system offers a multi-dimensional and multi-observational perspective of success. This paper discusses the benefits of the new strategy and the issues and problems encountered by the HA while implementing the project plan. It also analyzes the contribution of the new PMS to the project strategy.

Keywords: performance; measurement; stakeholders; strategy.

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Introduction

Traditionally, the distinction between good and poor project performance was defined by the project team's meeting cost, time, and product quality-related criteria, which researchers such as Atkinson (1999) have been described as the iron triangle of project management. This iron triangle is still regarded as the measure for gauging team performance on all types of projects. (The prevalence of this notion was recently confirmed by White and Fortune (2002) in their survey of 236 project managers representing 88 UK-based private and public sector organizations.) In the literature on the construction industry, other authors have described iron triangle performance requirements as the need to predict project costs, to confirm that projects will finish on time, and to verify in project documents that quality-related standards are met (Chan & Tam, 2000; Love, Gunasekaran, & Li, 1998).

Using the iron triangle as their measure, these authors reported that poor performance on construction projects typically causes significant cost and schedule overruns; Gardiner and Stewart (2000) add that these types of projects also fail to meet quality-related specifications. Lim and Zain Mohamed (2000) found in their exploratory study of electrical transmission substation projects in Malaysia that some of the factors causing cost and schedule overruns are not unique to construction projects. These factors include the project team's lacking experience, lacking appropriate skills, and lacking knowledge; these, the study revealed, are common and expected problems that recur project after project.

In contrast, White & Fortune's research (2002), which reported that 41 percent of the people they surveyed believed the outcome of their projects were a complete success, reported that the interviewees recognized environmental characteristics that are not present in all projects. The characteristics, said the interviewees, contributed to the difficulty of ensuring project success in the construction business sector. For example, Lim and Zain Mohamed (2000), in addition to finding generic problems such as lack of skills, experience, and skills, encountered construction project-specific problems, such as a lack of site supervisors, unusual site conditions, and new project participants unfamiliar with the industry. Likewise, in an analysis of the types of delays that affect the early stages of construction projects, Yates and Eskander (2002) reported, in their study of 101 United States (US) engineering and construction industry professionals, 20 different types of project delays, some of which include changing the project's

requirements and developing multiple projects with higher priorities.

Yates and Eskander (2002) also noted in their study that the two most common causes for these delays are constant changes to the project's requirements and a lack of communication among the various project parties. These, however, are generic problems that can affect the outcome of all types of projects. The organizational fragmentation inherent in the traditional client/contractor/consultant relationship on construction projects — as reported by Berggren, Soderlund, and Anderson (2001) — is exacerbating generic project problems experienced in other industries, such as large-scale engineering. Because of this, it is likely that these generic problems contribute to the project-specific problems project leaders encounter as they attempt to effectively and efficiently manage construction projects.

Since the 1980's, researchers and practitioners have developed other measures of performance beyond the iron triangle. These measures have led to a redefining of what constitutes good and poor project performance. A consensus has emerged in the literature that states performance is more complex than merely measuring cost, time, and quality. Performance, states the literature, is measured using various criteria, such as the perspectives of different groups of people involved in the project and the different stages of a project's life. Such a perspective of measurement is described as a multi-dimensional and multi-observational approach (Shenhar, Levy, & Dvir, 1997). In taking this perspective, theorists have identified two distinct components for measuring project performance: project management success and product/project success. The first focuses on the iron triangle and on the criteria used to implement the project; the second relates to the longer-term results yielded by the project's final product (Baccarini, 1999; Cooke-Davies, 2002; De Witt, 1988).

Given that a construction project is not completed until after the project delivery stage, when the facility is open and operating (Munns & Bjeirmi,

1996), project management success and product/project success perspectives suggest that in order for researchers and practitioners to be able to accurately measure the project's performance, their measurement must incorporate criteria that considers the project's life beyond delivery. These criteria may include meeting the long-term financial objectives of the client — such as internal rate of return — and satisfying the objectives of customers and users, such as their requirements for functionality and operability. The criteria should also gauge the project's ability to meet the objectives of external bodies, which includes complying with statutory and health and safety requirements (Jaafari, 2000). These requirements may also include the project's satisfying psychosocial criteria (Pinto & Pinto 1991), such as gauging the client- and subcontractor-satisfaction with the way the project was managed. Therefore, in assessing performance of a construction project, project leaders must judge the project both during and after the operational phase. The aim is to assess whether or not the project met its objectives (Cox & Townsend, 1998, p. 26; Morris & Hough, 1987, p. 193). Using measures that take the broader multi-dimensional, multi-observational perspective, the literature often records problems of performance. For example, Lim & Zain Mohamed (1999) document one client's dissatisfaction with the outcome of their construction project, the project team that delivered their project and the supplier organizations that serviced the project.

The history of poor performance on construction projects, whatever the measure used, is the backdrop against which both the private and public sectors have sought to identify alternative project management methods. Such alternative methods could enable these sectors to more successfully realize their project goals. The underlying goal of this endeavor is to ultimately improve project performance. The limitations of the traditional project management methods were reported in UK government-led reviews, such as those

produced by Latham (1994) and Egan (1998); these reviews highlighted an increase in pressure on public sector construction projects to embrace new ways of working. These reviewers pushed project teams to the point where they become examples of best practice. However, the reviewers found that the traditional methods caused conflict and disputes between client and contractor, disruptions which resulted in many clients resorting to litigation to resolve their differences. Such behavior increased animosity between clients and project teams and raised mutual suspicion that each party was trying to leverage advantage over the other. Researchers have also found that stakeholders working in the construction industry recognize the limitations of working under the traditional methods.

A study by Black, Akintoye, and Fitzgerald (2000) surveyed 78 individuals — construction clients, contractors, and consultants — and found that these individuals generally agreed about the specific failings that result from using the traditional methods: exploitation, rigid specification, decisions made with limited knowledge, and short-term focus. It is within this context of external pressure to change and internal recognition of current failings that the construction industry now seeks to respond to the challenges set before it: to improve its performance in serving clients and in working with organizations in the supply chain.

At the same time that the construction industry has been facing up to this demand for new methods, researchers and practitioners in other project domains (such as performance management and quality management) have adapted and applied to the management of projects, as the literature documents, changes that are moving the discipline of project management from a project-related performance perspective to a multi-dimensional and multi-observational perspective. For example, Stewart (2001) developed an approach to check the health of a project throughout its life cycle using the balanced scorecard (BSC) approach

which was developed by Kaplan & Norton (1992). In my previous research (Bryde, 2003), I, Dr. Bryde also developed a model for distinguishing between different levels of performance by using a Business Excellence Model framework (British Quality Foundation, 1998). Such initiatives are predicated on the belief that multi-dimensional, multi-observational performance management systems (PMSs) have a use in project environments.

The wider literature on management reports on the use of multi-dimensional/multi-observational-based PMSs in a variety of business sectors: Walters (1999) studied the case of the Estates Management Department of the Mass Transit Railway Corporation of Hong Kong; Kald and Nilsson (2000) surveyed 200 business units in Scandinavia; De Toni and Tonchia (2001) studied 115 Italian firms from the mechanical, electro-mechanical, and electronic industries; and Hlavacka, Bacharova, Rusnakova, and Wagner (2001) investigated the health care sector in Slovakia. All these studies confirm the relevance of using PMSs. However, one common theme to emerge from these studies is the difficulty in establishing management processes that allow for the practical implementation of PMSs. This difficulty is partly caused by the inherent complexity of the multi-dimensional/multi-observational perspective, with its different stakeholders using different success criteria (key performance indicators, or KPIs) or different competing values when defining successful performance (Walton & Dawson, 2001). Given that projects are typically characterized as containing diverse and vocal stakeholder groups, as noted by Cleland (1986), it is likely that such complexity and competing values are present in many project environments, including those related to construction projects.

The Research Context

Our literature review showed us that project teams need to take a multi-dimensional and multi-observational perspective regarding performance in project environments; our review also

showed that against both traditional and current measures of performance, the failings of project management practices in many industries, including construction, have historically resulted in poor levels of team performance. Our review highlights the way that new PMSs have been developed in response to the industry's wanting multi-dimensional and multi-observational perspectives; we also encountered the practical difficulty of successfully integrating a PMS that accurately reflects the various perspectives of different stakeholders into project management practice.

From our research, we found that by studying a project that changed the team's project management practice, which included modifications to its PMS, we could explore whether a change in the way performance was measured and managed would influence the team's perceptions of project management and product/project success. In addition to this, we examined the inherent complexity and competing values in the project environment to see how, if at all, PMSs were successfully integrated into the project management system.

The Research Study

We collected data by investigating the attitudes and experiences of project stakeholders working on a four-year-long Managing Agent Contract project in the North West of England for the Highways Agency (HA). This contract involved the team's providing construction services for maintaining trunk roads and motorways. The procurement strategy for this project changed from a traditional, compulsory competitive tendering (CCT)-type in its early stages to one based on the HA's Construction Management Pilot (CMP) scheme.

Theoretically, CMP schemes differ from CCT strategies in a number of ways. In CMP, specialist contractors are appointed to carry out work for the duration of the project, rather than the client bidding out each phase under separate contract within the overall project. And while several contractors are appointed to each specialist trade

package, work under the CMP is shared among the contractors. From the client's perspective, CMP has a number of aims:

- Tighter control over the quality of work produced by the contractors.
- Better management of direct relationships and through less sub-contracting.
- Closer integration of both design and construction skills.
- Improved flexibility in responding to client priorities.
- Less resources devoted to tendering and contract letting procedures.
- More transparent costs to help manage risk more effectively, which subsequently reduces a source of conflict.
- Shorter communication chains, which improve financial planning, resulting in more reliable outturn costs.
- Long-term relationships, leading to a more highly skilled workforce and ultimately to less product defects as the team strives for continuous improvement.

Likewise for contractors, CMP provides them with several advantages:

- Better prospect of winning business based on quality and ability.
- Prompt payment of accounts by the client.
- Continuity of workload through continuous involvement in the programming of work.
- Higher profits.
- Influence over the client's procurement strategy.

There are also other differences between the CCT and CMP. These are related to the degree in which project stakeholders are involved in the project. Table 1 illustrates these differences.

The construction manager's role in CMP, which can be compared to the resident engineer's role in a traditional procurement strategy, is pivotal throughout the project life cycle (PLC). This role links the stakeholders to the project. In CMP, the design team project manager and the specialist contractors

Key stakeholders in the PLC under the traditional procurement strategy							
Stage	<i>Conception</i>	<i>Feasibility</i>	<i>Design</i>	<i>Procurement</i>	<i>Construction</i>	<i>Handover</i>	<i>Operational</i>
Key Stakeholders	Client PM – HA Design manager – BG	Client PM – HA Design manager BG Design team PM – BG	Design team PM – BG Design manager – BG	Client PM – HA Design team PM – BG	Client PM – HA Resident Engineer – BG Main Contractor & sub-contractors	Client PM – HA Resident Engineer – BG Main Contractor Design Manager – BG	Client PM – HA Design manager – BG

Key stakeholders in the PLC under the CMP procurement strategy						
Stage	<i>Conception</i>	<i>Feasibility</i>	<i>Design</i>	<i>Construction</i>	<i>Handover</i>	<i>Operational</i>
Key Stakeholders	Client PM – HA Design manager – BG Design team PM – BG	Client PM – HA Design manager – BG Design team PM – BG Specialist contractors	Client PM – HA Design manager BG Design team PM – BG Specialist contractors Construction Manager – BG	Client PM – HA Design team PM – BG Specialist contractors Construction Manager – BG	Client PM – HA Design manager BG Specialist contractor Construction Manager – BG	Client PM – HA Specialist contractor Construction Manager – BG

Key: HA – Highways Agency, PM – project manager, BG – Babié Group

Table 1. Involvement of key stakeholders in the project

are brought in at an earlier stage of the PLC than when using a CCT strategy, whereas the client is involved at all stages of the PLC. Suppliers only become involved before the construction phase. CMP requires an on-going interaction among the stakeholders during the handover and operation stages. Such interaction ensures that the project will minimize disruptions to motorists traveling on the road network. And once construction is completed, the project team will review the project's performance, based on stakeholder involvement. This review ensures that the project team members continually improve. Given CMP's emphasis on continuous improvement, this review shows the differences in PMSs between the two procurement strategies: CMP has project management KPIs beyond CCT, beyond the team's meeting cost, quality, and time objectives. For example, one CMP KPI measures the client's involvement in the project; another KPI measures the extent to which consultants and contractors have shared knowledge, expertise, and resources during the

design stage; and yet another KPI focuses on changes in the project management process. These changes encourage the team to apply best practice and prevent their re-inventing of the wheel.

Munns and Bjeirmi (1996) define the project closedown stage as the point when the project is dismantled and disposed of—the point when the project reaches the end of its useful life. There is no closedown stage for the HA project we studied because this project involves ongoing infrastructure maintenance. Adams and Barnd (1988) and Spierer and Hamburger (1988) have both found that other PLC models consider closedown at the end of the implementation (construction) stage.

To obtain our research data, we conducted semi-structured interviews with a sample population of the studied project's stakeholders: project manager (client), design manager (managing agent), construction manager (managing agent), design team project manager (managing agent), and specialist contractor (contractor).

These five individuals were involved at each stage of the PLC.

Though the stakeholders we interviewed held project management positions, each had different roles and responsibilities. The construction manager, which equates to the role of resident engineer under CCT, manages the specialist contractors on the motorway network and co-ordinates the designs by the managing agent. The design manager — an individual from within the managing agent's organization — manages the overall design program and the budgets; this individual also co-ordinates the project's progress and the amount of capital spent, in conjunction with the client. The design team's project manager, also employed by the managing agent, manages the design team's work and liaises with the client project manager, the specialist contractors, and the construction manager. Table 2 summarizes the roles and responsibilities of the stakeholders we interviewed.

Our research findings offered us the opportunity to investigate the influence that the project management

Project Stakeholder	Roles and Responsibilities
Client PM – HA	Project manages the Bridges portfolio on the Maintenance Area. This includes ensuring Transport policy is implemented and financial targets are met within the demands of the Citizens Charter.
Design Manager – BG	Liaises with all design project managers. Links with construction manager to ensure projects are successful. Main point of contact with Client.
Construction Manager – BG	Co-ordinates the design and construction of work packages and overall work programme to ensure optimisation of design and resources, including the negotiation of prices with specialist contractors.
Design Team PM – BG	Provides general office management over several schemes and technical input for the design. Convenes design reviews to ensure progress is maintained. Ensures deliverables & budgets for whole programme are met.
Specialist Contractor	Acts as contracts manager, ensuring all contracts are completed on time and to budget. Responsible for sub-contractors and material orders. Ensures health and safety is in accordance with current legislation. Makes final decision on technical and commercial matters.

Table 2. Project stakeholders – roles and responsibilities

KPI has in shaping a team’s perceptions of project management success. All of our research subjects had previous experience working as managers on projects that used CCT, which as previously mentioned is a cost-time-quality project management KPI construct. Additionally, each interviewee had experience using the CMP-based procurement strategy, the multi-dimensional, multi-observational project management KPI construct. To better understand the roles, relationships, and interactions between the subjects interviewed, we constructed a context chart — shown in Figure 1 — based on a model by (Miles & Huberman, 1994, p. 102).

From our research, we noticed that a direct relationship can create a formal contractual link or a direct communications or reporting link; an indirect relationship is where the relationship between the two parties is managed via a third party or through an informal communications link.

To address the issue of construct validity that can arise from using a case study method, we used other sources of evidence, as suggested by Yin (1994, p.33). These sources included the contract documents we accessed, the HA’s CMP scheme manual, and our knowledge of the contract through prior employment with the managing agent. The latter enabled us to obtain some triangulation of data. We constructed a chain of evidence by linking the literature findings to the research question and to our analysis of the research

question. Finally, we passed back to each subject, for their verification, the transcript from their interview. We included with this transcript a copy of the interview framework that we used. We then analyzed our data around the issues of PMS, project management success, product/project success, and project management KPIs, as outlined in the previous section.

Findings

All of the subjects we interviewed believed that the CMP procurement

strategy produced more successful project outcomes in comparison to the traditional CCT procurement strategy. The construction manager rated CMP as “very good,” while the other four project stakeholders rated CMP as between “good” and “very good.” None surveyed believed there was “no difference” or that CMP is “poor” or “very poor” in comparison to traditional methods.

In terms of the project management KPI construct, all of the stakeholders emphasized the importance of

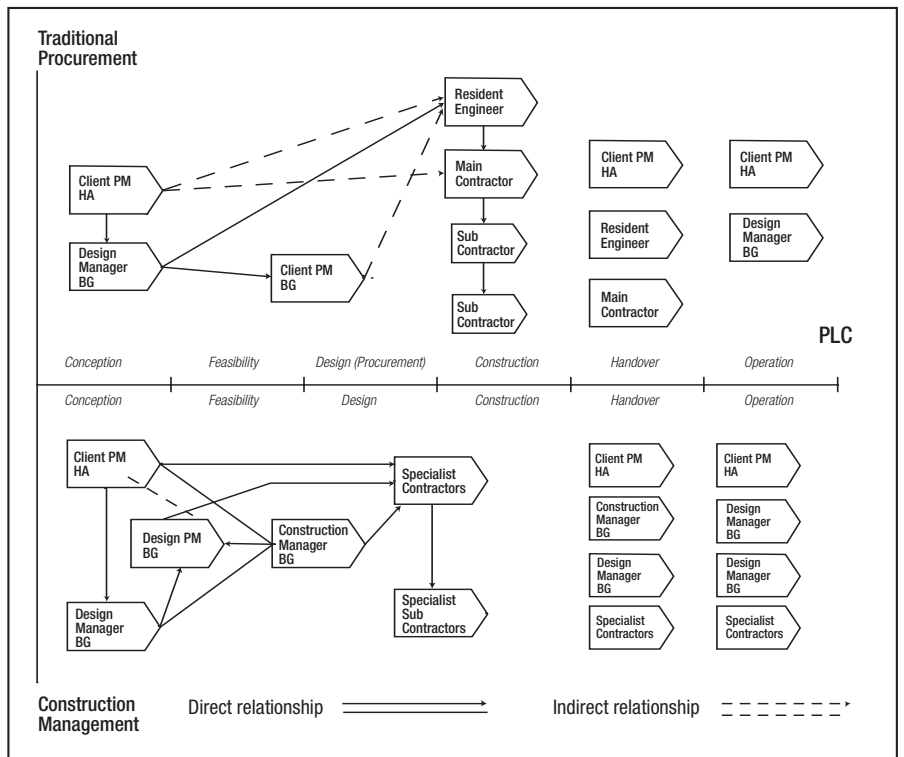


Figure 1. Context chart of stakeholders in the project life cycle

client satisfaction and quality. This emphasis was not affected by the change from CCT to CMP, though we saw evidence that CMP was enabling the team to enhance its performance in regards to these KPIs. This enhancement resulted after the team recognized that project satisfaction was influenced by changes in the project management process.

We did not see any evidence showing that the team's adopting a new procurement strategy changed the stakeholders' interest in the KPIs of cost and time. All interviewees regarded these indicators as important and essential to project management success; but in relative terms, they rated these indicators as subordinate to the KPIs of client satisfaction and quality. Despite the lack of change in emphasis, we noticed indications that the team had improved its capacity to meet the KPIs under CMP. For example, the client's project manager found that project costs were better predicted through the profiling of expenditure on a bi-monthly basis. This profiling improved the team's ability to keep better control of the project's expenses (which they kept within 5 percent of the budget). This achievement, according to the construction manager, is not a project expectation when using the traditional strategy. The client also reported a reduction in time spent on the network. Likewise, the view of cost, time, and quality failures — such as staying on the network too long and the cost of remedial work after the main work had been completed — had not changed under CMP; however, the team believed CMP provided them with the methods needed to better understand these issues and prevent these issues from occurring in the future.

We perceived that under the CMP strategy, the team's formal definition and measurement of individual KPIs enhanced the team's performance for the stakeholders' benefit, as compared with the results achieved with CCT. The client's project manager stated that health and safety aspects were better planned and managed when these were formally defined as a specific KPI.

According to our interviewees, having KPIs linked to the way the project is managed — such as encouraging innovation, the sharing of ideas, and continuous improvement — leads to improvements in these areas. For example, interviewees noted that one KPI related to measuring the extent to which consultants and contractors shared knowledge, expertise, and resources on-site or during the design.

The client's project manager stated that performance against this KPI would be discussed at every closedown meeting, thus allowing managers to identify improvements and compare performance across schemes. In addition, the focus on a wide range of both product- and process-oriented KPIs fostered an enhanced level of personal satisfaction. For example, the design team's project manager noted that the team's ability to be involved in the decision to change things on-site — and the fact that this increased involvement, which subsequently led to designs being built in 3-4 months — resulted in increased satisfaction. The construction manager described a more satisfying working relationship as a result of the team's obtaining increased interaction with the client, which in the manager's opinion led to a more open relationship and the sharing of information and ideas. For the specialist contractor, the fact that there were KPIs that focused on the need for long-term partnerships — relationships which establish a guaranteed future workload and a continuity of work — proved a source of personal satisfaction.

Our interviewees identified a number of critical success factors relating to their project. These factors include:

- Establishing relationships based on trust and mutual respect
- Having the right people in the right place
- Enlisting competent people
- Developing a clear client brief
- Maintaining a high degree of client involvement
- Establishing clear communication channels
- Ensuring the right information reached the right people
- Gaining senior management commitment.

The interviewees cited CMP as the element that put these factors — which were previously absent — into place. In addition to PMS, which made possible the placement of critical success factors (such as creating communication channels) during the project, another tool that the interviewees recognized as valuable was a visual-graphical output of performance. This output was typically a one-page document that showed stakeholders the project's measured results against the KPIs broad groupings of customer satisfaction, construction cost, prediction of cost, prediction of time, supply base, project time, quality, health and safety, and productivity improvement. The interviewees reported that each broad grouping had two or three detailed KPIs. The document also allowed stakeholders to compare actual performance and target performance against benchmark schemes; additionally, the document outlined the team's performance at comparable stages of the project life cycle, such as during design and in the final account.

We noticed evidence of problems in reconciling the inherent complexity and the competing values of diverse perspectives held by the stakeholders; we also saw evidence of problems in aligning all the stakeholders to the new way of working. The problem of reconciling inherent complexity and competing values was evident in the responses from the client's project manager. For the KPI related to cost effectiveness, the client was concerned that having preferred suppliers would ultimately lead to consolidation and subsequently reduce competition. The result would restrict the market to those contractors fortunate enough to receive appointments under the new scheme. The design manager raised similar concerns, stating that specialists who did not get on the preferred supplier list would be marginalized, which would cause them to lose out on work over the next five years.

Other KPIs related to the project management process: to the degree of involvement of the various stakeholders in this process and to the involvement of the government as

stakeholder, which was looking for the client to reduce the amount of project time involved in a contract in order to free up their staff's time to work on other things. The purpose of this involvement, for the government, was to engage this staff in its strategic planning activities as a network operator. Yet the new scheme, and indeed the industry best practice currently being developed by this project team, called for increased involvement as a measure of improvement against this KPI.

We found that the problem of aligning all the stakeholders to the new way of working was highlighted in the interviews with the design manager, construction manager, and specialist contractor. All three subjects identified the problem of getting the experienced individual specialist working in the new way. In the opinion of the construction manager, this was due to the fact that working under the CMP arrangement might typically represent only one-or-two percent of the specialist contractor's turnover. The specialist contractor would, therefore, not realize the amount of effort involved, in terms of managing work to meet the demands of the various KPIs. For example, the turnover of the work would not warrant the team's commitment to participating in all of the meetings, such as the closedown meetings described earlier. In addition, there was some evidence of difficulties in simultaneously achieving improved performance across disparate KPIs. For example, the design team's project manager described how the client had estimated final design costs at 30-to-40 percent above the prescribed budget on a particular scheme, due to the changing of the project's objectives, which in part was caused by increased client involvement. In terms of KPIs, the scheme might show an improvement in terms of stakeholder involvement, but at the same time it shows a decline in cost effectiveness.

Finally, the client's project manager raised the issue of the degree of measurement required under the new way of working. This individual high-

lighted the complexity of — and the competing values in — the project environment: striking a balance between the wider requirements of the Citizen's Charter with its obligations on minimizing network delays, while also justifying prudent spending and maintenance of a safe network. In this context, we noticed, however, a danger: too much measurement might be taking place, especially if the KPIs being measured have not been carefully developed to contribute to the organization's overall goal.

Conclusions and Further Study

Our study of a four-year-long Managing Agent Contract project that changed its project management KPI construct from a traditional CCT-type procurement strategy to one based on the CMP scheme highlighted that the stakeholders' perceptions of project success shifted with the change of strategy. All of the five stakeholders interviewed believed that using CMP schemes made it possible for the team to realize more successful project outcomes than when the team was using CCT strategies.

This study also highlighted a number of factors that resulted from the change in strategy, including earlier and increased stakeholder involvement and better team communications. These factors suggest that there is not one influential factor causing project success. Instead, project success is determined by a number of interrelated factors. In this context, this study suggests that a PMS constructed with multi-dimensional and multi-observational project management KPIs may be one such factor. On its own, a new PMS might not have a significant influence on outcomes, but taken with the other factors introduced through CMP, it has — as Figure 2 shows — an influence on project outcomes.

In our case study, we found that the PMS seemed to have an influence in two ways. First, it formally defined a broad range of KPIs, such as cost, quality, and health and safety; it also focused on performance in the defined areas. This focus gave stakeholders a shared and common understanding of the outcomes prioritized. Second, the use of PMS-related tools — such as the one-page visual communication tool

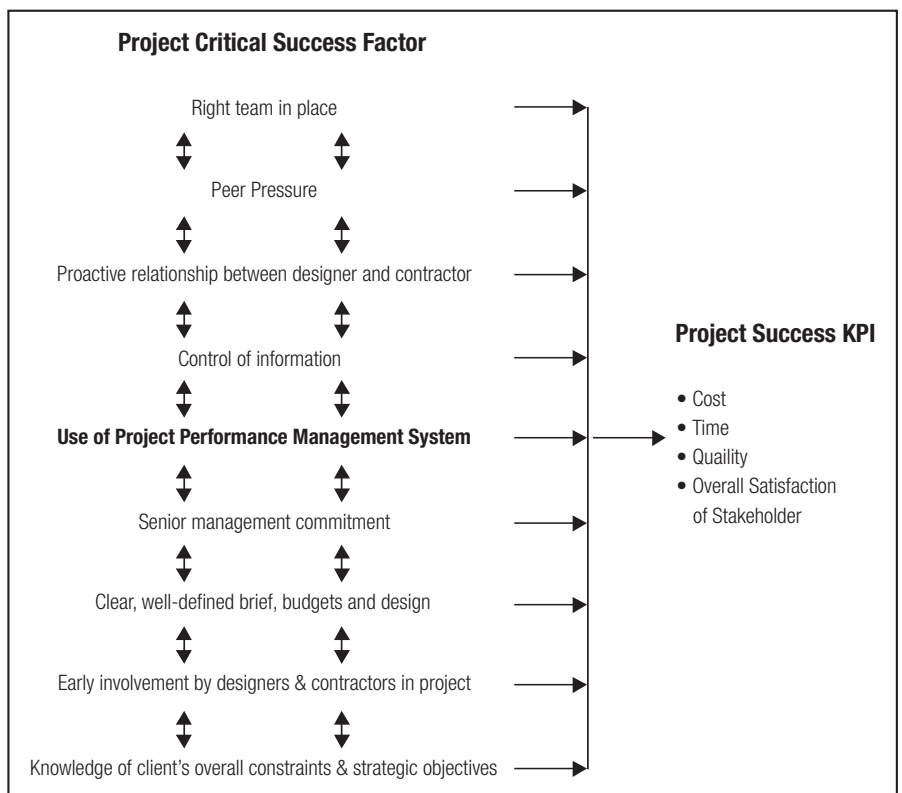


Figure 2. Project performance management system as a project critical success factor

used to define and monitor performance against KPIs — provided the team with an instrument for establishing other critical success factors, such as ensuring the right information reaches the right people. This visual communication tool not only integrated the PMS with other critical success factors, it also helped the team successfully integrate PMS into the project management system.

This study additionally revealed some of the problems linked to the inherent complexity and competing values in the project environment. One such problem involves achieving team consensus about KPI definition and the frequency of measuring KPIs. A second problem includes ensuring that all stakeholders understand and commit to the required new ways of working to meet all the elements of performance used by the PMS. A final problem deals with any inherent conflict between KPIs: for example, achieving better performance on a stakeholder involvement KPI might lead to poorer performance on a cost effectiveness KPI.

The changes in project management practice that we investigated in this case study are in the early stages of implementation. Indeed, the introduction of CMP was being undertaken as a pilot scheme. Likewise, the attitudes and experiences of the project stakeholders have been collected as a snapshot in time, captured at one stage of the implementation of the scheme. To gain a fuller picture, it will be necessary to revisit the case at a later stage to better understand the benefits and issues of introducing new project management methods that involve a change in the nature of a PMS. Over time, it will be possible to compare performance of the CMP approach by benchmarking it against similar schemes that used non-CMP traditional methods. Given the exploratory nature of this study, no wider generalized claims can be put forward in regards to our findings. Indeed, our findings may be atypical and may result from the specific nature and environment in which this project is occurring. Further work is required to test the validity of the exploratory

findings that we have reported in this paper; such a study should look at other project environments that have adopted multi-dimensional and multi-observational PMSs.

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