

# CONSTRUCTION PROJECT MANAGEMENT PROCESS QUALITY RESEARCH; AN EXPLORATORY EXAMINATION

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There is evidence of growing concern in the UK construction industry for the improvement of its processes. In the post 'Egan' era, there has been much debate concerning radical changes in the way projects are to be procured in future. This debate encompasses the whole construction process, including its management and technology. Central to this research is the need to better understand the influence of project management processes on the project performance. This paper presents preliminary work as part of a PhD research. Literature examining the influence of project management processes on project performance is reviewed. This shows the need for research concerning the influence of project management process quality (PMPQ) on construction project performance. Having identified the need for PMPQ research, a survey of research papers in journals and conference proceedings was done, aimed at examining the level of attention given to process quality. Survey results reveal that emphasis on quality research in construction project management leans heavily on the product of the process, while the importance of the quality of the project management process has attracted relatively less attention.

Keywords: project management, quality, process quality, and project performance.

## INTRODUCTION

Project management (PM) is a widely accepted management approach applicable to many industries. These include the military, space programmes, the construction industry, Information technology, the process industry and many other industries. Although the management of projects can be traced as far back as civilisation, Morris (1994) Adams (1989) Ritz (1990) and Harrison (1985) concur on the origin of what is now recognised as PM, to the United States of America, in particular to the US military programmes. The emergence of PM in the UK construction industry in the 1970's was likely due to a then perceived need to create efficiency in the construction process, (Walker 1985). PM as an identifiable role in the UK construction industry has been developed in the last twenty years. This is against the background that it is one of the oldest project-driven industries, (Morris 1994). Over the past two decades, PM has become more widely accepted as a management option in the industry. Indeed Latham (1994) reports of the increased use and acceptance of the system.

The issues recognised by Egan (1994) as being key to improvement in the construction industry include, processes and teams, a quality driven agenda, requirements for clients, leadership and commitment to people. These are intended to improve the overall performance of construction projects in terms of the key performance indicators (KPIs). These issues are undoubtedly at the heart PM. PM

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focuses on the needs of the client, the provision of leadership, the integration of processes and teams, delivering specified project targets in terms of time, cost and quality, and the motivation of team members (people issues). However indications are that PM in construction (Brown and Adams 1999) and in general (Morris 2000, Standish group 1994) has failed to consistently deliver project successfully. The under-performance of the construction industry in comparison to other industries (Latham 1994, Egan 1998) further questions the influence that PM has on project performance within the construction industry.

It is from this background that the influence of PM on project performance must be addressed. A lot of research has been done to look at this aspect. PM research has looked at causes of project failure and also identification of best practices (Goldstein, 2001). However with the increased use of PM, there is a growing demand to show the benefit of using PM (Ibbs and Kwak 1999, Morris 2000, Crawford and Pennypacker 2000). Although this relationship has been addressed from different angles, this research seeks to present an alternative way of addressing the subject. It specifically looks at quality of the PM process as a possible contributor to the performance of the construction projects. The importance of the quality of the process can not be ignored, as it is the process that creates the product, (Collier 1995). Although quality in construction is an aspect that is familiar, its discussion has concentrated on insuring the quality of the product, while the quality of the process has attracted less attention. However, in recent times, attention has been drawn to the quality of PM processes. This is seen in the development of ISO 10006, a quality management guide in PM. Ibbs and Kwak (2000, 2001), and others (Ibbs *et al.* 2001, Kalantjakos 2001, and Schlichter 2001) present a capability maturity model for PM, which aims at measuring the level of maturity of PM practices and processes. This is significant, though not robust, to PM process quality as it addresses the issues of standards in PM practices and procedures.

The paper starts by examining research work on the influence of project management on project performance. It then goes to present the findings of a survey of research work reported in journals and conference papers, which aims at establishing how well covered is process quality discussion.

## **PROJECT MANAGEMENT**

There are different definitions of PM, influenced by a number of factors. Walker (1985) recognises that definitions have been influenced by professional allegiance, or the perspective from which it is defined it. For example the PMI (2001) defines PM as 'the application of knowledge, skills, tools, and techniques to project activities to meet project requirements.' This definition is more from a technical point of view concentrating on the 'how' of the management process. However most definitions are from a management perspectives concentrating on what has to be managed, or specifically 'what' a Project Manager does. Walker (1996:5) defines PM as 'The planning, co-ordination and control of a project from inception to completion on behalf of a client requiring the identification of the clients objectives in terms of utility, function, quality, time and cost, and the establishment of relationships between resources, integrating, monitoring and controlling of the contributions to the project selecting alternatives in pursuit of the clients satisfaction with the project outcome'

This includes all aspects included in the definitions by APM, (BS 6079), and ISO 1006 (ISO 1998). The central point in considering these definitions is that PM is a

process concerned with the management of a project to a successful completion. This, in terms of the project objectives, would include completing the project on time, within budget, at the desired level of quality and satisfy the customers needs, Kerzner (1998). In light of the Egan challenges for the construction industry, KPIs are recognised as measures of construction project performance. These include; Client satisfaction, Defects, Predictability, Profitability, Productivity, Safety, Cost, and Time.

### **Project Management Processes**

Cleland (1994) looks at PM as being a series of activities embodied in a process of getting things done on a project by working with members of the project team and with other people in order to reach the project schedule, cost, and technical performance objectives. He defines a process as a system of operations in a production of something;- a series of actions, changes, or functions that bring about an end result. In principle, therefore, the PM process can be portrayed in terms of actions, changes or functions. In management terms the PM process would include, planning, organising, motivating, directing and controlling.

Turner (1999) discusses what he calls a process approach similar to the approach adopted in ISO 10006 (ISO, 1998) and PRINCE (CCTA, 1998) He looks at management processes as being the life cycle that takes the idea from vision to reality. Turner (1999) using Henri Fayol's management process model of plan, organise, implement, control and conduct, portrays a fractal PM process where each project stage is a mini project that has to be planned, organised, implemented, controlled and conducted. This is a similar approach to the PMI (2001) project life cycle approach model where each process group- initiating process; planning process, executing process, controlling process and closing processes- are applied at every stage of the project life cycle. These process groups are linked and are applicable to any phase of the project life cycle. Significantly in the PMBOK (PMI, 2001) a distinction is made between PM processes which describe, organise and complete the work of the project and product-oriented processes which specify and create the projects product. The BS 6079 (BSI 2000), model comprising project planning process and project control process, fits in these process models.

### **Project Management Process Quality**

Some of the definitions of quality include; 'a trait or characteristic used to measure the degree of excellence of a product or service' (Wideman 2001) and 'fitness for purpose' (Turner and Simister 2000) Although fitness for purpose is widely used, Wideman (2001) presents a definition that has become important in modern times. As quality has become a competitive tool and defined by customers, it is not just enough to meet the minimum required standard but has to be something clients can identify in terms of the degree of excellence. Project management process quality (PMPQ) can then be measured by the degree of excellence or the 'fitness for purpose' of the project management process.

Turner (1999) presents a five element model of managing quality on projects which includes, quality of the product, quality of the management process, quality assurance, quality control and peoples attitudes. It is seen from this model therefore that although quality of the product is the ultimate goal, quality of the management process should be recognised as a significant contributor to the quality of the product.

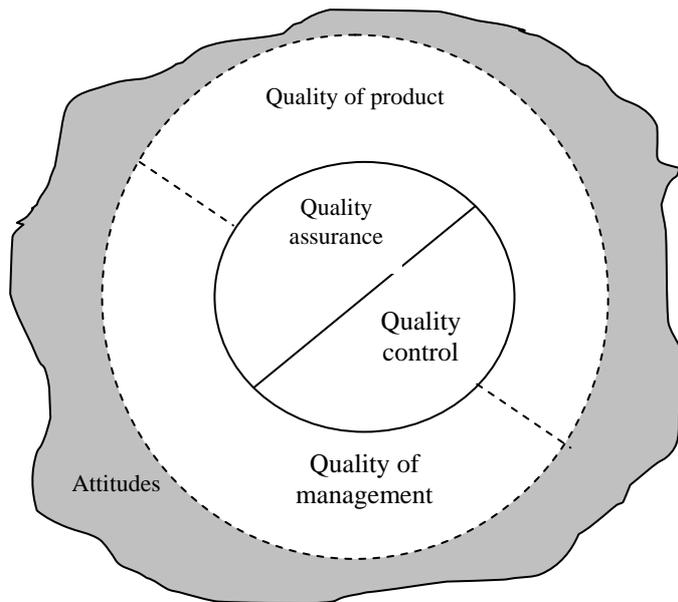


Figure 1: Five element model for project quality (Turner 2000)

From the PM process model in Figure 1 it is seen that the two distinct inter-linked perspectives of quality in a project, product quality and project management process quality (PMPQ) are both underpinned by quality assurance and quality control procedures. This distinction between product quality and PMPQ is also recognised in the PMBOK and ISO 10006. In differentiating process quality from product quality, Wideman (2001) defines process quality as the standard of the process by which the project's deliverables are produced while product quality as the standard that the project's deliverables actually meet. It is recognised therefore that the process of managing a project is important (Bryde 1997) as it is the process that creates the product (Collier 1995).

## PROJECT MANAGEMENT/PROJECT PERFORMANCE RELATIONSHIP

Different researches have been done in the area of PM versus project performance relationship. However most of the research works on the influence of PM, though significant, do not exclusively examine the influence of PMPQ on construction project performance. For example the works of Larson and Gobelli (1989), MCCollan and Sherman (1991), Alacon and Ashley (1998), Pocock *et al.* (1997), Deusch (1991, and Klien *et al.* (1996) are concerned with organisational aspects of PM and how they influence PM results. While Clarke (1999) Pinto and Mantel (1990), Pinto and Slevin (1988), Sherman and Wideman (1997) and Baker *et al.* (1983), model factors, within the PM processes and practices, that would influence project results. Others, (Brown and Adam 1999, and Crawford and Pennypacker 2000), present a methodological approach of measuring this relationship.

Ibbs and Kwak (2000) used CMM to demonstrate of the influence of PM processes and on project performance. They present a five level capability maturity model (CMM) which would help project managers to gauge how sophisticated their practices and processes are. They also link the level of maturity and project performance and conclude that there is a direct relationship between the level of maturity and performance. Kalantjakos (2001), Schlichter (2001) and Ibbs *et al.* (2001) also use this

approach to demonstrate the value of PM. CMM is one of the models that has been developed (Satpathy *et al.* 2000) based on the view that improving the quality of a process will deliver products of good quality (Grady 87). CMM in the PM industry has been borrowed from concepts of the Software CMM from the Software Engineering institute (Rosenstock *et al.*, 2000). There is, however, no standard maturity model established for the industry (Rosenstock *et al.*, 2000). Cook (1999) argues that although CMM is not universally respected by all practitioners, it provides a platform from which organisations can be alerted to the practices that must exist for good procedures. Voas, (1999) suggests that increasing the maturity level of an organisation may not necessarily lead to improvements in the quality of processes. Although Ibbs and Kwak (1999, 2000) found that there is a direct relationship between capability maturity level and performance, Debou (1999) questions the relationship between a high CMM level and high quality in products. It can also be argued that CMM is not robust enough to solely measure process quality. For example Parzinger and Nath (2000) in studying the relationship between quality management implementation factors and software quality categorise CMM as one of the measures of software quality.

Although PMPQ has not attracted much attention, it is important to note that process quality contributes to product outcomes. Few researches have exclusively examined process quality in PM. Barad and Raz (2000) have done some research on PM performance in the Hi-Tech and software industries in Israel. Their work was specifically looking at contribution of quality management tools and practices to PM performance. In their research, they show that PMPQ has influence on project management performance. Addit and Gunaydin (1998) modelled factors that affect process quality in the life cycle of building projects. This however, does not link process quality with project performance. The process quality versus project performance relationship is also demonstrated in other processes. Collier (1994) using the bank process demonstrates that process quality influences outcomes. Collier (1994) looked at process quality and how it would affect performance. He uses structural equation models to relate process quality and performance. The argument here is that the process is what creates and delivers value to customers in the market place and makes money for the firm. Parzinger and Nath (2000) in studying the relationship between quality management implementation factors and software quality also demonstrated the relationship between process quality and performance. Although these are not construction PM process specific, the construction industry can draw some lessons from them. None of these researches exclusively examine the influence of construction PMPQ on project performance. Although other industries and processes have demonstrated this relationship, it is apparent that PMPQ and its relationship with construction project performance need to be examined.

## QUALITY RESEARCH

Having identified the need for PMPQ research, a survey was done aimed at examining the level of attention given to process quality in literature. A survey of electronic databases on the Internet was used to examine this. Research papers from refereed journals were surveyed. A similar methodology has been used before. Themistocleous and Wearne (2000) surveyed the International Journal of Project Management (IJPM) and the Project Management Journal (PMJ) papers in examining PM topic coverage, while Zain *et al.* (2001) used electronic databases using the Internet to survey theses covering research on TQM. It has to be stated that the data gathered was limited as

most databases have only current information, mostly from only as far back as 1996. The method of collecting data involved electronic database search using the Internet. Web sites visited include those that are involved in disseminating construction and project management research. A total of 5 databases were used. Three of these were construction specific, while the two were project management specific. Using key words, *quality, process quality, project management and project performance*, relevant research papers were identified. The identified papers were then categorised into four areas using a modified project quality model as presented in Figure 1. The categories were;

- Product, representing work with a focus on product quality;
- Process, representing work focusing on process quality;
- Systems and procedures, which includes quality assurance, quality control and quality systems or standards and
- General category which included work that was of a generic nature including attitudes towards quality.

Table 1 shows the distribution in each of the databases. It is seen from Table 1 that there has been more written about quality of the product than quality of the process. All the databases have product quality ranking first in terms of coverage. Significantly the IPMJ and the PMI both PM specific databases, have the lowest percentages for product coverage at 38%. Research on systems and procedures has also dominated quality research ranking second to product coverage. Process quality research has the least coverage with an average total percentage of 12%. Significantly also, the highest score for process quality coverage come from the PMI. This is a dedicated PM database, which is bound to cover more on the project management process. Figure 3 shows the trends in quality research coverage in the PMI. This was used as it has the largest number of papers. It is seen that product quality has dominated over the periods in question, with process quality coverage significantly increasing in the last two years.

It is important to state that although the construction phase attracts more attention to quality, influence of design quality has been recognised also. Rounce (1998), for example, in looking at quality in architectural building design developed a set of indicators of quality (12 positive quality indicators) and another set for non-quality (19 negative quality factors). Tilley *et al.* (1999), in investigating a causal relationship between design and documentation quality on the construction process, identified design quality attributes and ten documentation quality attributes, which were used as a measure of quality. They also documented non-desirable elements of construction—such as rework, variations, cost overruns, time extensions, programme delays as a measure of construction process efficiency. Tan and Lu (1995) also investigated impacting factors on quality of the design project.

Having categorised the research, project quality process was further analysed. The aim of this was to analyse the themes and directions of the different research. The findings are shown in Table 2. The process research papers were grouped into 6 areas identified from the research. Common themes were used to group the papers. Process improvement ranked highest, followed by quality management while project managers influence on quality in the process the least. It seems project managers are more concerned with managing the project outcome and are less concerned with the influence they play in insuring quality of their management process. This suggests the

need for project managers to look into their processes. Significant also was the finding that few of these researches provide a link between project management quality and project performance. None of the research reported in the databases identified gives a robust view of project management process quality and its impacts on the project performance.

Table 1: coverage of quality in electronic databases

Database/Area	Process		Product		Systems		General		Total
ARCOM	2	5%	17	40%	12	28%	12	28%	43
PMI	12	18%	25	38%	18	27%	11	17%	66
IJPM	2	8%	10	38%	4	15%	10	38%	26
CME	5	13%	19	48%	9	23%	7	18%	40
JCEM	5	10%	32	64%	7	14%	6	12%	50
TOTAL	26	12%	103	46%	50	22%	46	20%	225

*ARCOM*-Association of Researchers in Construction Management. *PMI*-Project Management Institute. *IJPM*-International Journal of Project Management. *CME*-Construction Management and Economics. *JCEM*-Journal of Construction Engineering and Management

Figure 2: PMI

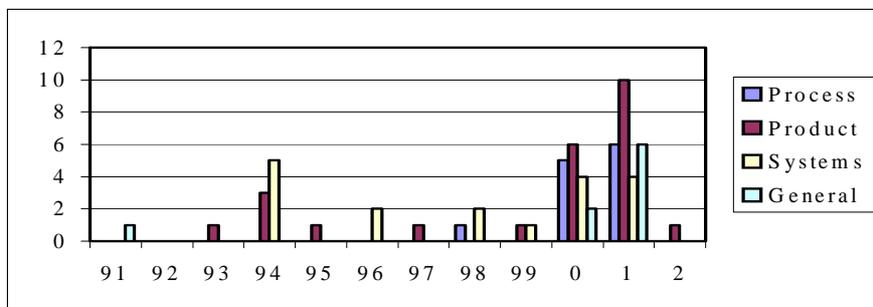


Table 2: Process quality themes

Theme	No. of Papers. (Total)
Data/Documentation management	3
Process improvement	11
Factors affecting process quality	3
General	3
Quality Management	5
Project managers influence	1
Total	26

## CONCLUSION AND FUTURE WORK

The need for a quality focus in PM process is clear. There is need to demonstration the value of PM to justify its continued use in the construction industry. This can be done by demonstrating the influence that PM has on project performance. This paper demonstrates that process quality can influence product outcomes. It therefore sets the scene for an examination of PM processes, using PMPQ as a significant contributor to the performance of project outcomes, to contribute to the debate on examining the influence of PM on project performance. Although the electronic databases used had limited information, they show a more recent view of issue, as most of the information was recent. The major finding in this paper is that the focus of quality in construction research has been on the quality of the final product, while PMPQ has had relatively less attention. The quality of the process is important as it is the process that creates

the product, therefore there is need for process quality research. It is also noted that in the few researches on PM process quality, there is lack of a robust approach to related process quality to project performance. Future work therefore would be to use PMPQ in examining the relationship between PM and project performance.

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