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# **THE CAPABILITY OF A CONSTRUCTION PROJECT TEAM IN THE IMPLEMENTATION OF A QUALITY MANAGEMENT SYSTEM**

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## **INTRODUCTION**

The concept of Quality Management System (QMS) is relatively new in the construction industry in Malaysia. It is however already existed since 1994 when in view of its importance to manage quality within this sector, the Government embarked on promoting the QMS to the construction organizations.

QMS is defined as “all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means such as quality planning, quality control, quality assurance and quality improvement within the quality system” [1]. It is believed that if the objectives of a firm are well defined and appreciated by all employees, the responsibilities of the department and the designation are clearly delineated and the procedures are well documented, it is likely that the products or services of the firm are “fit for purpose” and meeting the clients’ requirements. This is so important as for a company to remain viable it should meet the two essential factors i.e. to satisfy the client and to make profit. Evidences show that by adopting QMS, communications had been improved, mistakes, rework and wastage

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had been minimized, better control of subcontractors and suppliers etc., thus increasing productivity, profit and market share and meeting the client requirements [2,3]. Under the QMS for a specific project, the employer will forward his quality requirements to the employee. The activities, resources and events that will be deployed by the employee to meet the requirements for the specific project shall be written in a document called quality plan that provides a quality assurance to the employer and should be submitted before commencing the particular work.

It is however the success of the implementation of QMS is not solely depended on good and well-defined processes and procedures. To effectively implement the QMS, good and continuous improvement of both 'processes' and 'people' are advocated. Both people and process elements are interrelated; poor performance of the one impedes improvement of the other [4]. Thus, the capabilities of the practitioners also play an important role to the successful in implementing the QMS.

This paper is produced based on the research carried out at the Kuala Lumpur International Airport (KLIA) on the implementation of QMS. KLIA project was chosen because QMS was implemented there during the construction phase and due to the large number of contracts awarded, enormous data could be obtained easily. The latter is important as the research was done after the completion of the project and within a short period.

KLIA project comprises over 100 facilities divided into eight distinct group of construction packages: terminal complex; runways and aprons; earthworks and drainage; perimeter roads; central terminal area; southern support area; air traffic services; and utilities. This mega project had started in 1995 and had to be completed in 1997. In consideration of the critical period of completion the Government of Malaysia had appointed Kuala Lumpur International Airport Bread (KLIAB) as the project manager. Due to the complexity of the construction works, KLIAB had instigated the implementation of QMS to manage the project and to achieve the quality standard commensurate to the stipulated time, budget and specifications. 18 supervisory consultants and 110 main contractors were employed in

this project. Under the KLIA's QMS the supervisory consultants were responsible to the project manager whereas the main contractors were responsible to the supervisory consultants. The performance of this construction project team in the implementation of the QMS was analysed and the factors that impeded their performance will be discussed. These were the objectives of this research.

## **RESEARCH METHODOLOGY**

To achieve the objectives two research techniques had been adopted i.e. archival and interviews. Archival technique was conducted by analysing the monthly reports for the years of 1995, 1996 and 1997 covering the whole period of the construction phase, the quality manual of the project manager and the project quality plan (PQP) of the supervisory consultants and the contractors. The submission of the PQP by the supervisory consultants and the contractors was a mandatory as it was clearly stipulated in their contract and was a condition under the QMS. The aim of the archival work was to chart the extent of the performance of the construction project team on their effort to fulfil the quality requirements against the time. The researcher had difficulties to get an insight of the situation faced by the supervisory consultants and the contractors during the implementation of the QMS, as they were not normally available on site after the completion of the work. Moreover most of them were joint ventures and had split after their works completed, hence hampering the effort to trace them. The only possible approach was to interview the project manager's key personnel especially from the planning and quality assurance division. This and also the time constraint were the limitations of this study. Hence, the results may not truly reflect the views of the supervisory consultants and the contractors. Nevertheless, the interviews with the project manager had given some general indication of the factors that impeded their performance in implementing the QMS

## **THE PERFORMANCE OF THE PROJECT MANAGER**

In general, the performance of the KLIAB as the project manager in the implementation of the QMS was considered as excellence. It had produced its own quality manual that was based on the requirements of ISO 9000 standards. The quality policy, the structure of the organization, the responsibility of each management level and the designation, the process involved, the necessary resources, the procedures and the methods to control and complete the project were well-planned and comprehensively documented in the quality manual. The interesting features of the KLIAB's quality manual were it had included a consideration of the negative reaction of the consultants and the contractors towards the QMS by the statement in its quality policy; "it is KLIAB's goal to extend the awareness, acceptance and implementation of the quality system to our Consultants and Contractors" and it was regarded as a "living" document where necessary improvements of the policy and procedures will be done continuously [5].

Throughout the project, KLIAB had exercised all requirements and procedures stated in its quality manual. Audit against the supervisory consultants' works and verification of their audit against the contractors' works was carried out frequently. Many faults, weaknesses and unnecessary procedures had been identified through this process and corrective and preventive measures were applied accordingly. KLIAB had conducted several preventive actions and the most efficient was developing the awareness of and skill in implementing the QMS through regular workshop, meeting and seminar such as Quality Conference for Supervisory Consultants, Effective Implementation of KLIAB's QMS, Quality Planning in Construction, Internal Quality Auditing and Quality Assurance Coordination Meetings. The effort to develop the capability of the supervisory consultants and the contractors in the implementation of the QMS was an endless work. Nevertheless, KLIAB's patience and persistence to instigate a quality working-culture in the KLIA project had shown some improvement even though the problems appeared

relentlessly. All these can be evidenced from the performance of the supervisory consultants and the contractors in the next sections.

## **THE PERFORMANCE OF THE SUPERVISORY CONSULTANTS**

The quality requirements that the supervisory consultants had to abide and incorporate in their PQP were to provide and implement the procedures to:

1. check the contractors' method statements and testing procedures covering all aspects of works under their obligation,
2. check the contractors' corrective procedures,
3. conduct audit and other inspection of the contractors' works to ensure the contractors exercise quality control,
4. determine the conformances of the construction materials to the specification
5. keep and control quality records and documents,
6. prevent and handle substandard works; and
7. control and manage variation works.

The performance of the supervisory consultants in implementing the QMS throughout the project is shown on Table 1 (see Appendix 1). As expected, according to the records the supervisory consultants did not submit their PQP before they started their works. The document was produced gradually throughout the construction period. In the first half of 1995, only one procedure had been completed i.e. checking the contractors' method statements and testing procedures. This procedure was implemented accordingly. The rest were still unavailable. It was only in the second half of 1995 the supervisory consultants had begun to develop the procedures as required but as the construction works had started, most of the initial works had not been properly audited and checked. For instance, inspections were carried out without proper

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documentation as required under QMS. Most of the construction works were supervised by using conventional approach. Certain critical activities such as auditing and documenting were done inconsistently and consequently the supervisory consultants losing control over the contractors and had difficulty in tracing some of the documents.

Most of the procedures were finally developed and approved in the first half of 1996. In other words, a set of PQP was available. The challenge then was to implement the procedures. 1996 was a period where the supervising consultants practically adapted with the implementation of the QMS. This was the period where a lot of trainings conducted by KLIAB were taken place. The results were tremendous as can be seen from the successful implementation of the supervising works according to QMS in 1997. Auditing against the contractors' works was done frequently and the events, activities and results were properly documented.

### **THE PERFORMANCE OF THE CONTRACTORS**

The contractors were the most difficult among the construction project team to adapt with and implement the QMS. Their performance for the whole period of construction is shown on Table 2 (see Appendix 2)

There were five quality requirements established by KLIAB for which the contractors had to include in their PQP. They were developing and implementing procedures to:

1. execute the work including clear definition of their particular work, techniques and method statement to be adopted,
2. carry testing and inspection,
3. ensure the employment of only qualified personnel,
4. ensure the usage of only "fit for purpose" plant and equipment, and
5. keep records and documents of the implementation of the work.

Similar to the supervisory consultants, the contractors also did not submit their PQP before they went on board with the construction work even though it was stated in the Agreement. Ignorance to this key requirement led the supervisory consultants to issue 11 non-conformance requirements (NCR) to the contractors in July 1995. Without the PQP the contractors seemed to have no proper guidance on how to ensure that their work will meet the specifications. Most of the works were managed based on conventional approach. The works sometime were in accordance with the specification but many had to be redone. The substandard works were detected by the supervisory consultants who issued a number of notices of deviation (NOD) in 1995. For instance, an average of 30 NOD was issued in November 1995.

In the main the NCR and NOD were issued for the following reasons:

1. The contractors did not submit or were late in submitting the quality plan,
2. The works were not in accordance with the specification and KLIAB's requirements,
3. The records of work were inconsistent with the work executed on site,
4. Non-compliance with the stipulated rules,
5. Non-conformance with the procedures, and
6. No documentation.

In 1996, most of the contractors had submitted their PQPs. The analysis of the contractors' performance of the particular year shows that they were having a difficulty to put their PQPs into practice. This can be observed from continuing problems, which led to the issuance of the NCR and NOD even though the consultants and KLIAB had taken measures to prevent the reoccurrence of the problems. Among the habitual problems were:

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1. non-conformance with the procedures,
2. the records of work were inconsistent with the work executed on site, and
3. non-compliance with the stipulated specification.

In 1997, the contractors' performance was further improved, perhaps due to the trainings conducted by KLIAB. The contractors had implemented most of the procedures. Non-compliance to certain procedures and inconsistency in documenting were still occurred.

### **THE IMPEDING FACTORS AND SUGGESTIONS FOR IMPROVEMENT**

From the interviews the main factors that impeded the performance of the supervisory consultants and the contractors were discovered. They were:

1. lack of experience in the implementation of the QMS
2. extreme reliance upon the traditional methods of construction management
3. natural negative attitude towards new approach
4. 'trickle down' process where when large organisations implementing QMS the subcontractors or suppliers have to go along, was not materialised
5. misconception of the QMS; for example QMS mandates a higher level of product quality, QMS tend to major on bureaucracy, paper work, administrative cost and loss of innovative opportunity, and
6. the PQPs were prepared by the consultants that had limited knowledge about the construction processes.

In general all those factors were due to the failure to understand the ethos of the QMS, lack of positive view of the significant benefits that a QMS can bring to the construction works and also lack of capability



and skill to implement the QMS. As such, the following are suggestions to remedy the situation:

1. Instigate A Quality Working Environment

To promote a total change to the construction industry towards a quality-working environment is not an easy task. The importance of providing the quality working culture in the construction industry is however undeniable as it will unconsciously change the mentality of the construction community towards a quality working culture. Therefore steps should be taken to initiate the change. Commitment from all levels of management especially from the top level is very essential to materialise the concept. Thus the government should play its role to promote and educate the people especially the construction team through regular campaigns, seminars and courses so to convince all participants in construction to implement the QMS in their companies and projects.

2. Enforce Companies To Implement QMS

By enforcing a regulation to construction companies and consulting firms to implement the QMS, the construction team will have no choice rather than to practice the quality system in their projects and consequently the QMS will become part of their life. For those who disregard the requirement, they are not allowed to participate in any tender or undertake any consulting services. Although this is considered to be a rigorous stance it is definitely the best way to enhance the quality of the consultants and the contractors in Malaysia. As a bi-product they will then have a competitive advantage in competing with foreign companies for international projects.

3. Frequent Training and Seminars

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It is evidenced from the KLIA experience that training can constructively make a rapid change to the perception of the QMS and a rapid development of the skill to implement the QMS. Thus the developers in the public and private sectors should play their role to promote training to the project managers, the consultants and the contractors. For example, the developers can request them to attend a QMS seminar or having a QMS certification before they can participate in their projects. This will encourage the consultants, the project manager and the contractors to implement QMS in their organisation.

### 4. Increase Audit Frequency

To ensure the smooth run of the implementation of the QMS, auditing has to be carried out frequently. Inconsistency in auditing will lead to lost control over performance and the quality of the work, resulting the failure to accomplish the work in time and to the specification.

### 5. Incentives

Incentives, either monetary or otherwise by job guarantees and forms of appreciation should be given to the construction team for successfully performing the work in accordance to the QMS requirements. This will encourage them to continuously implement the QMS. All benefits that the company gained during the implementation of the QMS should be publicised to dispel the fear and misunderstanding of other companies on the implementation of the QMS.

## **CONCLUSION**

This paper highlights the capability of the construction project team in the implementation of QMS in the KLIA project. The level of understanding and capability of the consultants and contractors was extremely low at the beginning of the project. They had to learn whilst they were implementing the QMS in their project. Even though some of the consultants and contractors were of international standard, they were still need to be trained and guided by the KLIAB. By organising some training programs and seminars the level of understanding and capability of the construction project team was enhanced and further developed especially towards the end of the project.

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