

The defects management in public hospitals construction essay



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Defects waste time and money, and affect the overall performance of the built environment. However, these problems can be minimized with proactive application. This study was developed on the concepts of re-learning Defects Liability Period (DLP) Management process for public hospital Design and Built projects. Investigation was carried out to DLP and Plan Preventive Maintenance (PPM) management services at seven hospitals. A comprehensive study was carried out to identify the types of defects, causes and how the defects were mitigated and rectified. It further established ' what went wrong' during the DLP period and proposed improvements needed for future projects.

Keywords: Defects, Defects Liability Period Management, Plan Preventive Maintenance, Public Hospital

INTRODUCTION

Building projects have become very complex, and in most cases design and construction are more or less separated from each other and performed by different companies. This has lead to many examples of defective designs and construction workmanship such as designs that were not possible to perform or that needed redesign before it can be constructed, resulting in delays and/or overrun budgets or major crack in structure that resulted in costly rework and adversely affecting the overall performance of the built environment. Although a large percentage of defects occur during the construction process, the numbers can be minimized to reduce the overall impact on projects. To do this development teams need to implement a defect management process that focuses on preventing defects, catching

defects as early in the process as possible, and minimizing the impact of defects.

Design and Build (D&B) project is becoming popular in Malaysia due to increase in demand for infrastructure and building projects especially during the construction boom periods in the 1980s and 1990s. According to Seng and Yusof (2006), D&B is identified to benefit project delivery in terms of cost, time and quality due to increased accountability by the service provider, single source project delivery, and a value based project feedback system features. They also identified Kuala Terengganu Hospital as the first D&B project managed by Malaysian Public Works Department (JKR) in Malaysia that was constructed in 1983 and completed in 1985.

This study was carried out to seven (7) public hospitals which were completed on the D&B concept on behalf of JKR and the Ministry of Health (MoH) Malaysia in Peninsular Malaysia between the year 2005 and 2007. During the Defects Liability Period (DLP), a third party company was appointed to monitor the fulfillment of the DLP contractual obligations and requirement by D&B Contactors appointed for the projects. This third party was required to produce the Condition Appraisal Report of these seven hospitals at the end of the DLP. The aim is to assist JKR to identify weaknesses in the current project delivery processes, and to ensure that the end user requirements of future similar projects can be better met.

WHY DEFECTS MATTER?

Previous research showed that study of defects in buildings is important due to interests from the construction industry, authorities and even the

government. Reputation of the construction industry in a country is often exposed in public media that might highlight negative perception of the public and even foreign media. It is also believed that the costs caused by defects represent a considerable loss in the economy, about ten percent (10%) of the turnover in the construction sector (Nielsen et al., 2004).

Construction defects have negative impacts on the value of the projects and on the image of the contractors that executed the project. Construction defects have impacted more negative costs on projects than the costs of remedy. They also cause accelerated decay of new and refurbished properties.

Several definition of the term defects especially on physical building concentrate on project documentation, building material, structure or any part of a structure that lacks abilities which can be expected according to the construction contract, public requirements or good building practice. It may happen at any stage of construction and seen as a technical. Several studies also showed that the unacceptable quality due to construction defects in a project can be identified and remedied. These defective construction works are classified as failure of complying with the express descriptions or requirements of the contract, either on drawings or specifications, together with any implied terms and conditions as to its quality, workmanship, durability, aesthetic, performance or design. Defects can cause malfunction of a project and can take place in any part of a construction project from foundation, floors, walls, roofs, doors, windows, ceilings, fittings, electrical work, mechanical work, plastering, painting, landscaping and others.

Unfortunately, these construction defects are not easy to define because studies have shown that many involved construction workers and even project stakeholders. They are said to be inevitable in construction projects delivery and many studies have shown that they usually caused controversies between the client (project owner) and the contractor or subcontractors as many construction defects are related to quality which is difficult to quantify and can only be described in a relative term unlike quantity, cost and time which are specific. However, in the case of public hospital buildings, it is important to manage construction defects as it involves property assets for the operation of health care activities as well as efficient delivery of services for their different users and stakeholders.

3 RESEARCH OBJECTIVES AND METHODOLOGIES

A combination of qualitative and quantitative methods was adopted for this research. The qualitative research was adopted to study on the types of defects, causes and how the defects were mitigated and rectified. Data for the qualitative data was drawn from the records of defects collected from the DLP management records. The first stage of the data analysis involves observing, sorting and grouping the data using SPSS program. Descriptive statistics were used to analyse and understand the pattern of responses from the results. Basic understanding of data and relationships between the variables were tabulated to provide a reasoned perspective for the interpretation of the results.

A qualitative research method was implemented by carrying out several semi-structured interviews with the senior management people of four (4) hospitals. A structure of research questions was prepared to facilitate the <https://assignbuster.com/the-defects-management-in-public-hospitals-construction-essay/>

comprehensive exploration of data for the analysis. The recorded interviews were then converted and transcribed into Microsoft Word format and analysed manually to produce a detailed analysis. It was noted that several comments from the interviews were seen to provide fresh insights to the phenomenon investigated during the analysis.

DATA ANALYSIS AND FINDINGS

The analyses undertaken were broken down into the following elements:

Overall defects recorded by end user and Concession Company upon expiry of DLP period and status of disputed defects.

Defects identified based on scope of work.

Defects due to design, workmanship, quality of finishes and materials.

In this research, it was identified that many defects were not classified on a standard common basis. There were several missing data that were required to ascertain the root of the defects. In these cases general analysis was undertaken that did not undermine the relevancy of the findings significantly.

4. 1 Analysis 1 – Defects Recorded by end user and Concession Company upon expiry of DLP period.

Table 4. 1 shows number of final defects recorded by end user and concession companies upon expiry of DLP period. It also indicates the status of disputed defects issue that could lead to delay in issuing the Certificate of Making Good of Defects (CMGD) to D&B Contractors.

Table 4. 1: Overall Defects Recorded by end user and Concession Company upon expiry of DLP period.

No.

Hospital

Final Defects

No. of dispute defects

Status of disputed defects

1.

Hospital #1

6261

453

Resolved

2.

Hospital #2

2652

214

Resolved

3.

Hospital #3

5473

None

Resolved

4.

Hospital #4

1023

None

Resolved

5.

Hospital #5

8518

553

Resolved

6.

Hospital #6

2743

None

Resolved

7.

Hospital #7

605

376

Resolved

From the study, it was found that Hospital #5 was observed to record the highest number of final defects (8518) whilst the lowest recorded number was Hospital #7 (605). It was also noted that all the final defects were rectified and all disputed defects were resolved. Based from reports, Certificates of Making Good Defects (CGMD) were already issued to the hospitals.

4. 2 Analysis 2 – Defects identified based on scope of work.

Analysis on the types of defect based on scope of works was next carried out for each hospital. This was to establish the kind of defects recorded within each hospital. The defects were classified into: (i) Architectural defects, (ii) Civil and Structural defects, (iii) Mechanical System defects, (iv) Electrical System defects, and (v) Bio Medical Equipment defects.

Table 4. 2: List of defects based on scope of work identified

From the study, Architectural Works were identified to contribute the most numbers of defects for all hospitals analysed except for Hospital #5. For

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Hospital #5, Mechanical works recorded the most defects. It was noted that the numbers and percentages of these defects identified were relatively very high, and would be a potential problematic undertaking for the hospital end-user should these not been addressed during the DLP management period.

4. 3 Defects due to design, workmanship, quality of finishes and materials.

The study further investigated on the types of defects, causes and how the defects were mitigated and rectified during the DLP management. Based from theoretical studies, the defects were identified to impact Technical, Aesthetics and Functional character/performance of the hospitals.

Contributors of defects were also detected.

Based from analysis, it was found that the defects impact on Technical aspects of the building's performance and the operation significantly. This was especially so with defects associated with building services, Mechanical and Electrical (M&E) as well as Bio Medical Equipments. Defects related to Aesthetics tend to spoil the image of hospital.

It was found that, most of the defects that were related to Design were due to poor decision(s) in design which include specification of materials, layout and integration between different materials and systems usually by designers. Majority of defects were found to originate from poor workmanship by contractors and installer that include poor installation, mixing of materials, material handling, failure to provide proper joints/gaps/materials to avoid defects. Defects were also found from poor material quality and not according to specification by designer.

There were also issues of defects due to failure to provide proper protection which leads to defects during construction. Failure to carry out maintenance or lack of maintenance was also found to contribute to defects of building performance or systems in hospitals. Lastly, vandalism during construction and DLP management identified in several case studies that contributed to defects of construction projects.

Feedback from End User

In order to support the quantitative data analysis in 4. 1 to 4. 3, a qualitative data analysis from a questionnaire survey was carried out by the third party company as well as the researchers. Feedback on the satisfaction was sought from hospitals end users and the respondents were randomly chosen employees of the hospitals from various departments engaged in the day-to-day operation of the hospitals during the DLP. A total of 589 respondents from three hospitals participated in the survey.

The themes of the enquiry on satisfaction and the focus of the interview questions were concentrated on four main themes as below:

Building design on the architectural design, space, fittings, layout, and services.

Building and structure over workmanship, finishes, aesthetics, function, safety, ease of maintenance and comfort.

Services rendered by third party company from users and stakeholders involved on responsiveness in meeting the end users' needs to attend to defects.

Performance of the main contractors on the promptness to make good all defects identified and reported as well as producing quality work.

Analysis from Interviews

Analysis on building design on the architectural design, space, fittings, layout, and services.

Based from the study, it was found that 80% of the end users were satisfied with the hospital building design but a significant percentage (31%) of the respondents were slightly satisfied with the hospital building design. Equally there was a small percentage (21%) of respondents who were dissatisfied with the hospital building design such as building layout, lack of spaces, building finishes and others. It should be noted that the investigation on the origin of the respondents with respect to the hospitals that they are serving would be necessary to identify the groups that are strongly satisfied, satisfied, slightly satisfied and dissatisfied.

Analysis on building and structure over workmanship, finishes, aesthetics, function, safety, ease of maintenance and comfort.

The results obtained were quite similar to the previous analysis. Majority of respondents (63%) fall within satisfied band (slightly satisfied, satisfied and strongly satisfied), with an almost equal percentage of respondents who were strongly satisfied (20%) and slightly satisfied (16%). However, 9% of the respondents were dissatisfied with the building and structure. Several complaints were obtained on leakages, defective wiring and many defects were only noticed during and at the end of DLP.

iii) Analysis on services rendered by third party company from users and stakeholders involved on responsiveness in meeting the end users' needs to attend to defects.

It was found that majority of the respondents were satisfied with the services provided by the third party company in managing DLP. 12% of the respondents were strongly satisfied, 56% satisfied, 22% were slightly satisfied, while 17% were dissatisfied.

iv) Analysis on performance of the main contractors on the promptness to make good all defects identified and reported as well as producing quality work.

10% of the respondents were strongly satisfied with the main contractor's performance, 72% were satisfied, 20% were slightly satisfied and 10% dissatisfied. Complaints were on late responses and poor workmanship.

DISCUSSIONS AND THE WAY FORWARD TO PREVENT PROBLEMS FOR FUTURE PROJECTS

Several studies defined construction defects management as the process of identifying, recording, reporting and correcting defects. Management of construction defects must be referred to the terms and conditions of construction contract that affects quality and scope of the contract. Within the D&B system, the results shows a strong tendency for the need of a special designated party to be assigned to capture and manage all the defects, propose the rectification method and monitor closely the works undertaken by the contractor.

a) Significance of third party appointment to manage DLP.

Based from this research, JKR has appointed a third party company to manage the DLP. Findings based on quantitative and qualitative analyses found that the third party has been very significant in providing effective DLP management within the seven hospital projects. This can be exemplified as the followings:

Defect was monitored closely and complaints by the clients were promptly addressed.

Potential defect was comprehensively identified through routine inspection and site inspection.

The root cause of the defect was identified and suggestions for rectification were in place.

Defect rectified by the contractors was closely supervised.

Planned preventive maintenance (PPM) schedule was closely monitored and verified.

The actual PPM activities carried out by the contractors was also monitored and verified.

Disputes which arise between the contractors and hospital support service were mediated and resolved quickly.

Although the numbers of defects identified from each hospital were very large at the on-set of the DLP management but almost all the defects identified were rectified and resulted in the issuance of CMGD. Based from

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other research, evidences were found to show that many D&B projects in Malaysia fail to identify number of defects and eventually many have not been issued CMGD. Inability of addressing defect problems in D&B construction can lead to serious performance, management and cost implications to the hospital management people after the DLP.

b) Identified issues surrounding the design and construction management of some components of the building, selection of materials, workmanship and supervision.

The findings that emerged from this study clearly underline the need for a comprehensive DLP Management input for design and build hospital projects. Based from the seven case studies it was found that Architectural defects constitute to the most number of defects followed by Mechanical, Electrical Works, Civil and Structural Works. Underpinning these defects is the adequacy and effectiveness of the management process practiced in D&B process of the hospitals.

It was also noted that based from end user feedbacks in Analysis 4. 4, several useful insights to the nature and impact of the defects were discovered. It was found that users have some fundamental issues that concern the approach of how the building design was conceived, and how the design was consequently implemented during construction. Several fundamental findings were discovered that could be noted as below:

Standardization of the selection/specification of materials especially for the hospital equipments, their testing and commissioning.

Procurement process of these items (who procures and when?)

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Delivery of the equipments to site and matters pertaining to handing over the project.

Involvement of the end user in the design and construction process.

Involvement of the end user in the pre-CPC inspection.

Design audit.

Future extension of the hospital building.

conclusion

DLP is an important phase in construction project. Project seems to be finalized, but in actual situation this phase is very complicated that most of the people are not interested to look into. This study was developed on the concepts of re-learning the whole DLP Management process for D&B projects. It was undertaken to critically evaluate and appraise the services provided by a third party company in managing DLP and the PPM carried out by the D&B Contractors. Identified gaps within the current process were distinguished which suggest improvements needed. The fundamental finding of the research is the need for the DLP management process to be more holistic in meeting the needs of the end users.