

S16-5**POTENTIAL PROBLEMS OF RUNNING BUILDING MAINTENANCE PROJECTS IN CONSTRUCTION**

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ABSTRACT: The problem of urban decay in Hong Kong has drawn much attention of both practitioners and academics. Poorly managed buildings not just give a negative image to the Pearl of the Orient in the region, but also pose potential risk hazards to the health and safety of the general public. While it is necessary to devise a comprehensive plan on redevelopment and urban planning, preserving the existing buildings to maintain their conditions for habitation can be a short-term option to safeguard quality standard. With the increasing number of ageing buildings in Hong Kong, a lot of research efforts have been devoted to managing repair and maintenance projects properly (for example those initiated and funded by the Construction Industry Institute, Hong Kong; and the current study financially supported by The Hong Kong Polytechnic University). Given the short duration and more diversified nature of work, building repair and maintenance works are found to be more difficult to monitor and regulate when compared with new works. This paper aims to provide a comprehensive analysis on the problems of running building maintenance projects. An extensive review of contemporary literature was firstly conducted, which forms a solid basis for developing an empirical study on the problems and difficulties of running building maintenance projects from the viewpoints of industrial practitioners with a view to formulating effective strategies for managing maintenance projects successfully.

Keywords: Difficulties; Problems; Project Management; Repair and Maintenance.

1. INTRODUCTION

The maintenance of buildings plays an integral role in the whole design and construction process of buildings [1]. It accounts for over half of the total output of the building industry in most developed economies [2]. For example, more than 50 percent of construction projects undertaken in the United Kingdom are building maintenance projects [3]. Hong Kong, after two decades of rapid development, is no exception. The quarterly gross value of construction work at locations other than sites, which is traditionally considered as the volume contributed by the decoration, repair and maintenance, and minor work has indicated a remarkable increase over the past 10 years (Fig. 1) [4].

Report from the Hong Kong Census and Statistics Department shows that the percentage of the gross value of repair and maintenance work to that of the total construction work has been increasing steadily over the past 10 years, despite the decreasing gross value of the total construction work over the period. In 2007, the total contract value shrank to \$93 billion, in which building-type construction has a share of almost half of the total contract value (18.5% for residential buildings and 19.8% for non-residential buildings) and one-tenth of the contract value (10%) is of the civil engineering type of construction. Moreover, more than half of the total contract value (51.6%) was repair and maintenance work. While the total contract value in 2007 was only 70% of the total at its peak value at \$139 billion in 1997, the share of

repair and maintenance works has increased more than a double over the past 10 years (from 22.5% in 1997 to 51.6% in 2007).

Although construction is commonly recognized as a high risk activity, the number of construction accidents in Hong Kong has shown a healthy decrease of 85% over the past decade, from 19,588 cases in 1998 to 3,042 cases in 2007 (Table 1) [5].

The Labour Department of The HKSAR Government plays an important role in improving safety performance of the construction industry. Accordingly, analyses have been conducted on a regular basis to investigate the causes of accidents and provide recommendations to avoid future re-occurrence. Although the total number of reported accidents has been decreased significantly over the last 10 years (from 19,588 in 1998 to 3,042 in 2007), the percentage of the accidents in the repair and maintenance work to all reported construction accidents increased by nearly three times over the same period (17.9% in 1998 to 50.1% in 2007). Even worse is that half of the total number of reported accidents in 2007 were related to repair and maintenance works. The increase in the number of repair and maintenance work, and the increase in the number of accidents concerned prompt a need to identify potential problems and difficulties encountered in implementing such type of projects so that the performance of the maintenance projects can be satisfactorily monitored.

2. METHODOLOGY

The aim of this paper is to identify common problems of running building maintenance projects in construction. The research disseminates the preliminary findings of establishing a benchmark model for maintenance projects. Similar research has been undertaken by the authors on the measurement of success for maintenance projects [6]. The present research was conducted by means of a comprehensive literature search from

publications in the construction industry. Relevant textbooks, high-ranked journal papers and conference proceedings were screened for the potential problems and difficulties of running maintenance projects reported by previous researchers and practitioners. While the current paper aims to report preliminary findings of literature review of problems of running maintenance projects, research efforts have targeted on organizing structured interviews with the participants of maintenance projects within the Hong Kong construction industry. Opinions solicited from the structured interviews can be analyzed and quantified to differentiate the responses of various project participants and to obtain the relative importance of the attributes under investigation.

3. CHARACTERISTICS AND PROBLEMS OF RUNNING BUILDING MAINTENANCE PROJECTS

RICS [7] defined building maintenance as the work undertaken to keep, restore and improve every part of a building. Some researchers [8] considered building maintenance as improvement, refurbishment, maintenance and repair works to the existing private and public constructed facilities. While Yiu et al. [9] claimed multiple-ownership has caused difficulties in organizing maintenance works from the legal point of view, such as the case of Hong Kong where buildings are tall but ageing, on project level maintenance work includes all activities that maintain or restore the existing stock of constructed facilities [8]. It has a number of unique features which are distinctive from new construction and so managing maintenance projects poses challenges to project management.

3.1 Lack of expertise to deal with constraints of existing buildings

Refurbishment projects involve more uncertainties and risks than new-build construction [10]. De Silva et al. [11] pointed out that the inherent maintenance problems in

facilities are heavily attributed to design limitations, lack of construction knowledge, inadequate inspection or maintenance, and material limitations. Chew and De Silva [12] also criticized the expertise and equipment are always insufficient in repair and maintenance works. As a result, a construction supervisor is always assigned to more than one maintenance projects simultaneously, which may create compressed and multiple responsibilities of the management team [13]. This situation becomes aggravated where the works involve demolition activities and where tenants are in occupation [14]. In addition, the cost of making good and general clearing away is disproportionately high, which incurs substantial disturbance costs on the operation of the building.

3.2 Unclear scope with inadequate contract and specifications

Yiu et al. [9] claimed that some clients of small building works in private residential blocks are relatively inefficient at acquiring the necessary information themselves and so they may not excel at spelling out their needs to the project team. Moreover, such clients have no direct contact with the designer or builder of the building which they occupy and maintain [15]. As a result, their needs may not be effectively conveyed to the project team. As maintenance projects potentially contain more technical and economic uncertainties, hidden risks are entailed due to partial or unreliable information from the client which may result in ambiguous scope of work [16]. As a result, works are commenced on site with incomplete design, contract and specifications that may provoke future disputes [17]. Such problems as inadequate contract and specifications, unhealthy financial condition, lack of proper supervision and inefficient communication with the laborers are prone to exist in maintenance projects.

3.3 Fragmented nature of repair and maintenance works

Maintenance work is labour intensive, which generally involves many separate types

of construction work carried out by multiple trades [18]. It involves small packages of work with several trade subcontractors working within a confined area [19]. The idea was agreed by Yiu et al. [9] who also pointed out that maintenance work normally requires works to be attended at short notice, which can lead to problems in resource mobilization. Moreover, Zavadskas et al. [20] described building maintenance as being carried out in a minor, short-term and discontinuous process mostly performed manually. This was echoed by Reyers and Mansfield [16] who claimed that refurbishment work is a highly specialized area of activity demanding specialist workers for different trades. Therefore, it is difficult to achieve economies of scale and utilize resources efficiently [21]. CIRIA [22] considered repair and maintenance works as generating lower profit margins than new-build. As refurbishment projects are more resource intensive and contain many small-scale items, the contractor will incur high supervisory and managerial costs. Moreover, it is more difficult to use standard products on refurbishment and renovation projects and so opportunities for prefabrication and industrialization are limited [10].

3.4 Price uncertainty and short duration

Maintenance work is considered as costing more than new work since it is usually carried out on a small scale. It requires a large number of workers employed on site by hand activities [14]. Since refurbishment projects are often relatively small in scale, the resources input in such work are rather limited in terms of time and cost [18]. Tse [23] further pointed out that some maintenance projects are even under-funded and the budgets are not proportionate to the overall expenditure. As a result, the price determination problem of maintenance projects induces higher risks and uncertainties to both the clients and the contractors. While the contractors face unpredictability in submitting tender bids, the design professionals believe that the increased risks and uncertainties can disrupt the traditional

requirements for price certainty [16].

3.5 Inactive attitude of participants and communication problem

Shen et al. [24] pointed out that many countries did not rank maintenance high in the national budgets because there is a perception that any problem from the lack of maintenance is somebody else's business in the future. Arditi and Nawakorawit [25] also held the same standpoint that few building owners regard planned maintenance as a matter for serious concern. Kwong [26] offered another reason for many building owners not realizing the importance of timely maintenance because in most cases, the client is not the end user of the building and their concern is rather short-sighted with emphasis on short-term financial return only. The infrequent communication between property managers and building designers often causes design-related maintenance problems [25]. Designers do not care much about the factors affecting building maintenance, probably because they are influenced by the building owners who often place strong emphasis on the initial costs of the building. De Silva et al. [11] even suggested the lack of cooperation among the parties in a project should be the culprit of maintenance problem. As a result, conflicts can arise among residents and other stakeholders in relation to building management and maintenance issues [27].

A review of contemporary literature provides a solid knowledge base for understanding potential problems of running building maintenance projects from the viewpoints of researchers in the past. Following the outbreak of SARS in early 2003 in Hong Kong, much effort has been placed on enhancing the success of managing maintenance projects. It is therefore of value to gather lessons learnt from literature review to identify problems of running maintenance projects with a view to developing a benchmark model for improving project performance.

4. CONCLUSIONS

The research provides an in-depth study of identifying potential problems of managing building maintenance projects in Hong Kong, and the research findings are believed to be influential to knowledge development and applicable to maintaining existing pools of ageing buildings. Recent statistics shows that the number of renovation, maintenance, minor alteration and addition (RMAA) works is on the increase, and the accident rates concerning the RMAA works also arouse the wide attention of the local construction industry. This study further gave an overview of the characteristics and problems of running maintenance projects from a comprehensive literature review, which include *Lack of expertise to deal with constraints of existing buildings; Unclear scope with inadequate contract and specifications; Fragmented nature of repair and maintenance works; Price uncertainty and short duration; and Inactive attitude of participants and communication problem.* Findings from this empirical research can form the basis of developing an empirical study on the problems and difficulties of running building maintenance projects from the viewpoints of industrial practitioners and then devise effective measures for managing maintenance projects to enrich the maintenance field of knowledge in construction.

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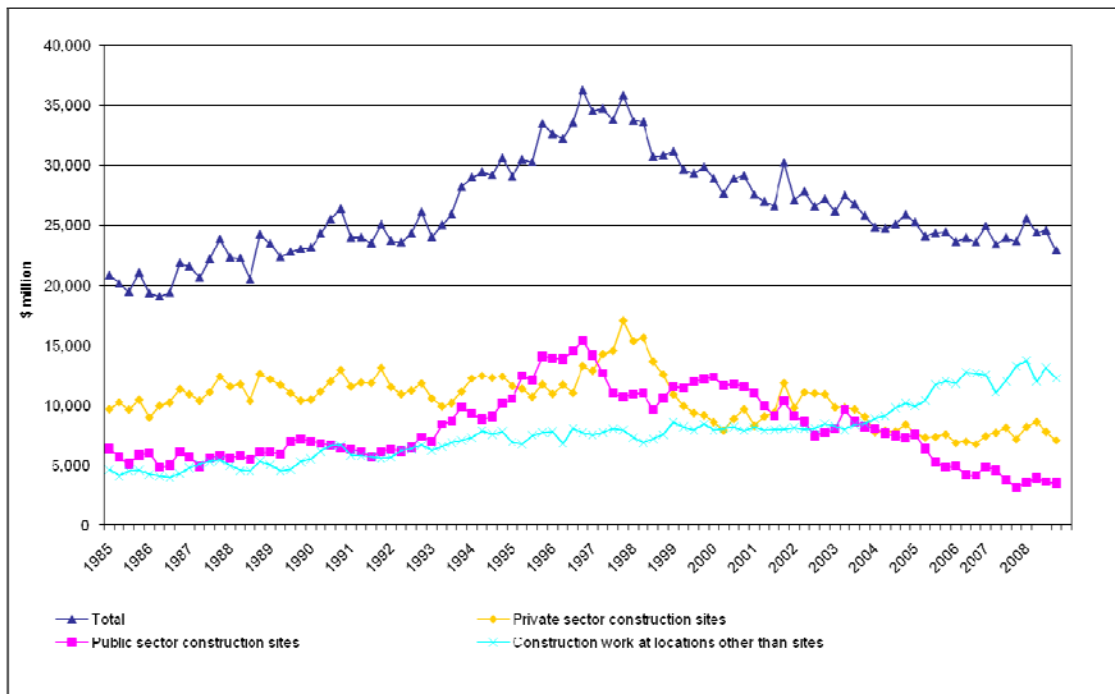


Fig. 1 Quarterly gross value of construction work at constant (2000) market prices [4]

Table 1 Construction accidents in repair, maintenance, minor alteration and addition work (1998-2007) [5]

Year	Total number of all reported construction accidents (a)	Number of reported accidents in repair, maintenance, minor alteration and addition work (b)	Percentage of (b) to (a)
1998	19,588	3,510	17.9%
1999	14,078	3,328	23.6%
2000	11,925	3,402	28.5%

20 01	9,206	2,582	28.0%
20 02	6,239	1,925	30.9%
20 03	4,367	1,485	34.0%
20 04	3,833	1,454	37.9%
20 05	3,548	1,509	42.5%
20 06	3,400	1,697	49.9%
20 07	3,042	1,524	50.1%