Building Maintenance Management Effect on Buildings Life-Span

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Abstract
Building Maintenance Management is essential to prolong the building life cycle and reduce the company loss. When buildings are neglected, defects can occur which may result in extensive and unavoidable damage to the building fabric or structure. The attentions and skills of maintenance are required for the construction of buildings in this twenty-first century. Because much architectural education is still focused on the one-of-a-kind assignment, encouraging the notion of personal fulfillment through leaving a mark for off-springs and obtaining a design award by means of concept drawings. Due to the reason that many building designers (architects, engineers, technicians) are not carried along in the subsequent maintenance of the building, they just regard it as other specialists' responsibilities. In all likelihood, the building user-to-be having no formal role: the building contractors just fulfill their accountabilities to complete the building in compliance with the contract documents, not to care occupier's needs and wants. This research focused on the effect of building maintenance management on the life-span of buildings.
Keywords: building maintenance, life cycle, preventive maintenance, corrective maintenance

1.Introduction

Maintenance is defined as a combination of technical and administrative actions contributing to the protection manufacturers. and satisfactory operation of asset. Maintenance includes Emergency corrective maintenance - must happen everything from regular cleaning to repairs and immediately for health and safety or security reasons. It can be as small as changing a washer to stop a leaking tap, or as large as repainting an entire deterioration of the structure or fabric if unattended building. Good maintenance helps retain the value of building and makes the property more enjoyable to occupy. Neglect of maintenance can also become a fire and safety hazard which could result in being legally liable for any injuries. A repetitive process is needed in order to provide for any injuries adequate maintenance. Maintenance can be categorized discovered and corrected in a timely manner. Maintenance according to why and when it happens includes the required processes and services carried out as in corrective maintenance. This includes cleaning gutters refurbishment or replacement to current standards. It should be pointed out that, the considerations and assistances of maintenance are required for the construction of buildings in the twenty-first century. Because much architectural education is still focused on the one-of-a-kind assignment, encouraging the notion of personal fulfillment through leaving a mark for offspring and obtaining a design award by means of concept drawings. Due to the reason that many actors in the built environment are not encompassed in the subsequent maintenance of the building, they just regard it as other specialists' responsibilities. In all likelihood, the building user-to-be has no formal role: the building contractors just fulfill their accountabilities to complete the building in compliance with the contract documents, not to care occupier's needs and wants. Furthermore, it is hard to renovate and rebuild buildings at one time. In the meanwhile, the value of buildings declines as the aging of building unless specialist maintenance carried out on the building [4]. Defect is regarded as part of design of building, construction or materials which are not in compliance with requirements of the contract and quality of norm.

Additionally, design fault is built-in since the construction work is carried out based on the drawings. But materials and workmanship can be determined and controlled during the design stage. Moreover, the issue of maintenance can arise from the fault of design stage [5]. Compared with other stages of building construction which rub off on the maintenance, the design stage always inflicts drastic impact on the issue of maintenance. In addition, the professional concern about maintenance should be brought into the design stage on a par with the consideration of buildability. The faults of design stage can be categorized below:

• Failure to comply with established design criteria regarding choice of materials and structural systems; Architects overlook basic physical properties of the materials. New materials or forms of construction are not tested for use; Using materials under the improper climate or natural condition

•Poor communication between architects and construction team. Thus, initiatives should be taken during the design stage considering about the issue of maintenance. In the meanwhile, architects, engineers and other consultants are supposed to ensure the design of building is maintenance-friendly and sustainable throughout the entire life of building. As can be seen from Figure 4, with proper maintenance approach, your elevating element can last 20 or more years before a modernization is necessary.

3. Impacts of Building Maintenance on Life

Building maintenance affects three aspects mainly with respect to our lives. Firstly, it links with safety and

health of human and properties. Secondly, it is related with economy, from the small scale of economy that is a city or town's economy, but in the scale of large scale that is the whole country' economy. Finally, it is able to affect social and environmental issues to some extent. The objectives of building maintenance are :

• To ensure the building and its services are under a safety condition.
• To ensure the buildings are available for use.
• To ensure the condition of the building meets all statutory requirements.
• To maintain and retain the value of the physical assets of building stock by carrying out the building maintenance
• To ensure and retain the quality of building

From the point of economic view, building maintenance is helpful for owners retain the economic and market value of their real assets. Building is like other consumption good, is a capital asset. They would be deteriorated by wear and tear lacking proper maintenance on a par with other assets, such as machines and vehicles. Despite building maintenance cannot eliminate the aging of building completely, but it can postpone the value of building asset declines retaining its value substantially.

Furthermore, poor maintained buildings depreciate much faster than buildings which are under proper maintenance. From the viewpoint of housing supply, building maintenance can be regarded as part of determinant to influence the size and quality of housing stock in a country. Apart from the importance of building maintenance relating to safety and health of human and properties as well as importance of economic aspect, building maintenance inflicts its own impact on the social and environmental perspectives.Moreover, there are some groups, such as low-income families, ethnic minorities are expelled from the redevelopment areas, resulting in homelessness and unemployment as well as redevelopment would incur a mass of construction and demolition waste. Hence, building maintenance helps to prolong the life-span of buildings and postpone the necessity of redevelopment, which is good for social and environmental friendliness [7].

4. Maintenance Database

Despite of necessary building maintenance approaches, maintenance data base is vital aspect of building maintenance. Because comprehensive maintenance database is able to provide sufficient information for building surveyors or other relevant people who are in charge of building maintenance to concern about the condition of building. Furthermore, it is a basis for building surveyors to conduct a condition survey as well as it can save money, shorten time of operation. Therefore, it is usual for experts to obtain complete and exact data concerning building functioning, history of maintenance, and previous condition. In the event, the objective building does not possess its own data base of maintenance. Professionals can refer to other buildings' database regarding previous building maintenance records. Then, they can determine the most optimal approach to rectify or restore the building. But, it is better to refer to the same type of building, because the relevant records with respect to building maintenance and building condition are the most suitable and available.

Regardless of using objective building's own database or referring to the analogous type of building, the approaches of building maintenance implemented should be combined with building surveyors professional judgments on the spot. Due to the reason that the previous data is regarding the past-time condition after all, it is likely out of date or its records of condition and building maintenance data is not available for current condition [8]. Hence, it is necessary and important to refer to building surveyors and other experts' assessments. There are at least three categories of users of reliability databases and all of them need different types of data:

• Risk and reliability analyst for analyzing and predicting a reliability of complex systems
• Building maintenance experts ought to measure and optimize the maintenance performance
• Building surveyors are responsible for analyzing and optimizing the component performance

4.1 The Need for a Database Maintenance

The systematic collection of reliability-data is the cornerstone for the building maintenance database. Since 1980s there are plenty of attempts to conduct researches for collecting and organizing raw data, and standardize the information and records presented in the data banks.

But these efforts and researches are partial and restrained on some particular prosperous areas. Apart from that, it is confined by accurate data, incurring suboptimal parameter estimates and imperfect decisions about renewal cycle and preventive maintenance activities. According to the study presented by Cunha regarding certain aspects with negative impact in the performance of building maintenance planning task identified and its integration with other schedule of building maintenance are discussed. Likewise, Duarte stated even though, building maintenance experts can plot proposal of building maintenance plan empirically by database, the condition of independent building is different dramatically. Only a system that records the data in a unified and coherent method would be accessible for estimation and decision of strategies of building maintenance..

Meanwhile, it needs to request degree of priority of the building maintenance strategies taken to inhibit the progress of defects and rectify them in full measure. The importance of such a policy is obvious, and it can

ensure realistic availability of building, the establishment of a reliability and building maintenance database requests a collaborative effort from the governmental department, and the customers, occupants as well as maintenance providers. These three aspects are the vertices of a collaborative triangle that is built can enhance efficiency of strategies of maintenance, and can be conducted throughout a dynamic planning of building maintenance operations. There are some sources contributing to the generation of database on the advent of e-technologies. As some information is contributed to the database which must be complemented by specialist tools that can figure out the reliability and maintenance parameters. These tools can act as a doctor to make diagnosis, and prepare for schedules of building maintenance activities. Therefore, they are supposed to be regarded as an indispensible element in assisting decision management system.

4.2 Database Requirements and Impact

Constitution of database of building maintenance should be built on the reliability and availability. Moreover, building maintenance database is supposed to be related to information regarding building characteristic and condition of performance. Hence, it means that in building maintenance, database should be recorded plant-specific operational data, ambient conditions, maintenance operational data and defects data local climate data [9]. Building maintenance estimation for the reliability, methods of maintenance, inspection and schedules for maintenance activities should be based on building maintenance database. However, some certain problems arise as collecting building maintenance data in different conditions. Making comparison is necessary to standardize the data collected, which requires a qualitative and quantitative statistical analysis. Furthermore, during the collection, building maintenance needs active interaction between owners and building maintenance providers.

Forecasting techniques are essential to infer the possibility of any defect and building failure. Building condition monitoring allows collecting data of the parameters regarding building valuation. All of the data is help to create a picture that what defects would happen in the future. The higher and more comprehensive volume of data and its quality, the lower possibility of error arises. If recorded data emphasizes a momentum in the observed values, it may be predicted when the alarm of defects goes over the boundary. There are plenty of sophisticated quantitative methods, but empirical studies are still concluded that the post sample-accuracy of simple methods is as useful as advanced complex methods. Actually, the averaging of the predications of results deduced by more than one method is more accurate than the individual methods. In order to achieve high effectiveness in data collection that requests a comprehensive and careful study related to the building structure and conditions of components of building. Furthermore, all of selected components of building should be assessed and monitored. From the current sophisticated perspective that it is critical part of building maintenance data in terms of building functions or according to the records of failures. In terms of the design and implementation of the building maintenance database, it is identified as below:

• To rise up the standardization of information, therefore the link between different departments information system and maintenance database.
• To establish reference data, like features of common defects building maintenance companies and governmental department which in charge of issue of safety and occupancy of buildings.
• To regulate the procedures and standards of building maintenance.
• To apply an analytical approach to maintenance analysis by means of methodology RAM Reliability, availability, maintainability

With regards to maintenance planning, it is thought that each company should have its own policy and use its information technology system for which public building maintenance database can serve reliable and comprehensive data. These data can support effective and efficient planning tasks. The availability of these data to those systems in each building maintenance company can be regarded as a sort of service:

• To regulate process of construction to a standardized vision;
• To establish in the clear and easy way of storing the database and the associate records for each parts of building project, exposing standard building maintenance information
• To plot the maintenance plan by means of the exportation of standardized building maintenance information
• To import or export data regarding building maintenance for different situation of buildings in terms of condition and location of building as well as ambience of building.

A critical issue for carrying out the collection of data is from the building on spot, the information is the first-hand data and it is easier to be linked with building maintenance planning systems. Iung et al [10] present a series of advanced technologies that can be utilized to support the data collection and implement the corresponding strategies.

• New sensors or other monitors can be installed to collect and transmit data about building's status
• Global Positioning System installed to position the location of operators and maintenance tools
• Wireless technologies and specific standards to ensure the integration and interoperation between different building maintenance systems
• Methods and tools based on statistical records for diagnostics and prognostics and maintenance planning

• Web Services In the common perspective, the design and implementation of such building maintenance database should be controlled by maintenance service provider.
As for the customers, the maintenance database can enhance its ability of performing throughout entire life reducing operational costs [10]. Final occupant can have benefit from this database system. Certainly, the database of building maintenance is updated and maintained for further performance.

5. Conclusions

Maintenance is needed throughout the entire period that the building remains in use or occupation as well as building inspection which is conducted from the inception of construction to the occupants living. Both of them are aiming to provide safety for users and building owners. Additionally, buildings may fail due to a number of reasons, such as faulty design, faulty construction, faulty maintenance, faulty materials and faulty use. Thus, the building is vulnerable to be affected and need indemnity for the building quality.

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