Economic Society and Humanities Vol. 2 No. 1, 2025

Engineering Project Management Study for Hospital

Kai Wang*
Logistics Department, The First Affiliated Hospital of Wenzhou Medical University, Wenzhou, Zhejiang, China
**Corresponding Author.*

Abstract: With the rapid development of medical and health care, the public has higher requirements for the quality of medical services and the medical environment. The traditional simple hospital project has been unable to meet the current hospital construction needs, which puts forward a series of challenges to the hospital project managers. This paper mainly from simple classification of medical engineering project, the hospital project characteristics, project management difficulties and management optimization measures for the four major points in detail, put forward a modern hospital project management ideas. These ideas have a little reference significance to the hospital's engineering project management.

Keywords: Engineering Project Management; Hospital; Simple Classification of Medical Engineering Project; Hospital Project Characteristics; Project Management Difficulties; Management Optimization Measures

1. Introduction

With the rapid development of medical and health care, the public has higher requirements for the quality of medical services, medical environment, and so on, so the standard of hospital engineering project construction has also risen [1]. As one of the core tasks of modern hospital management, project management in hospitals promotes the orderly operation of various tasks, and its management level will directly affect the economic and social benefits of hospitals. This article focuses on the core issue of project management in large hospital engineering projects. Firstly, it elaborates on the characteristics of hospital engineering projects, then analyzes the difficulties in project management, and finally proposes management optimization measures. This article analyzes the new challenges faced by modern hospital logistics and infrastructure construction, in order to provide reference and guidance for relevant personnel.

2. Simple Classification of Medical Engineering Project

The engineering projects of hospital cover various types, but in summary, common hospital engineering projects can be simply divided into three categories.

2.1 New Hospital Construction Projects

The new construction project of a hospital is a process from scratch, usually in the early stages of hospital construction. In the early stage of hospital construction, relevant staff need to carry out scientific and reasonable planning and design based on factors such as the hospital's functional positioning, service population, and development scale. This includes determining the distribution of hospital departments, the number of wards, outpatient reception capacity, etc., while considering the overall layout of the hospital, such as the reasonable division of medical areas, office areas, emergency areas [2], logistics support areas, as well as the planning of supporting facilities such as parking lots and greenery.

2.2 Hospital Renovation/Expansion Projects

The renovation/expansion project of the hospital is that the current building cannot meet the operational needs of the hospital, so it is necessary to carry out renovation or expansion on the original basis. Staff need to conduct a comprehensive evaluation of existing buildings and facilities, analyze their structural safety, rationality of functional use, and degree of matching with the hospital's development needs, determine the areas and contents that need to be renovated and expanded, and consider the impact of the

renovation and expansion project on the hospital's normal medical services, and develop a reasonable transition plan.

2.3 Hospital Renewal Project

Certain areas of the hospital are in disrepair, resulting in performance, functionality, and visual effects that are not comparable to their original appearance, so renewal work is carried out on them, but the renewal project does not involve functional changes. Project managers should prioritize safety, both during the construction process and to ensure the structural safety of the renewed building and the safe operation of the medical equipment. Renewal works should pay special attention to environmental protection and hygiene. Renovation materials should be made of environmentally friendly, non-toxic, odorless and antibacterial products to reduce indoor environmental pollution and protect the health of patients and healthcare workers. The garbage and pollutants generated during the construction process should be cleaned up and disposed of in a timely manner to avoid pollution of the hospital environment. At the same time, it is necessary to strengthen the hygiene management of the construction site and carry out regular disinfection and sterilization to prevent the spread of bacteria and viruses.

3. Characteristics of Hospital Engineering Project

As a special building and place, the engineering projects of hospitals will have significant differences from general buildings, mainly reflected in three aspects: complex construction environment, integration of multiple professional technologies, and strict quality control.

3.1 Complex Construction Environment

The hospital has diverse functional areas, including outpatient, inpatient, operating room, pharmacy, negative pressure isolation room [3], laboratory, equipment supply room, laboratory, etc. Each area has its specific functions and related technical specifications, which increases the difficulty of construction design and coordination.

3.2 Integration of Multiple Professional Technologies

Hospital engineering projects involve multiple professional technologies such as architecture, medical equipment, medical gases, electrical engineering, water supply and drainage, purification air conditioning, and fire protection [4]. During the construction process, it is necessary for various professions to collaborate and complete the project tasks together. The architectural design of hospitals should meet special medical needs, such as wards, operating rooms, and functional rooms for laboratory departments. For example, in 2019, the world was swept by COVID-19 virus, and hospital construction projects need to pay attention to complex ventilation systems and purification systems, which are not found in other construction projects [5]. At the same time, the various specialties in hospital engineering projects are different from those in ordinary buildings, such as electrical engineering. Some areas cannot be powered off for a long time, while some special areas must not be powered off [6-7].

3.3 Strict Quality Control

The functional rooms such as operating rooms, laboratory departments, obstetrics and gynecology departments, and venous configuration center in hospitals need to have a certain level of cleanliness, and the construction quality of their engineering projects directly affects the safety of patients' lives and medical quality. Therefore, this type of engineering project must strictly control the quality requirements, including construction technology, material selection, and construction process, all of which must comply with relevant standards. During the construction process, it is necessary to strictly control the pollution of noise, dust, wastewater, etc. on the construction site. Effective environmental measures need to be taken, such as setting up sound barriers, using environmentally friendly materials, and strengthening construction site management, to ensure that the impact of hospital construction on the surrounding environment is minimized.

4. Difficulties in Project Management in Hospitals

4.1 Construction Environment Limitations

Hospital construction environments are often complex and require construction within

existing healthcare facilities, which can cause disruption to normal healthcare activities. In addition, strict health and safety standards need to be followed during construction, adding to the difficulty of construction.

4.2 Pressure on Schedule

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4.3 Unclear Project Requirements

The functional requirements of hospitals are complex and diverse, involving multiple stakeholders such as doctors, nurses, administrators and patients. Different requirements may lead to blurring of project goals, affecting the feasibility and implementation of the design solution.

4.4 Difficulty in Coordinating Design and Construction

Hospital engineering involves the design of several specialized fields, such as architecture, structure, mechanical and electrical, and environmental protection, etc. The coordination and cooperation among various specialties require a high level of technical support. The complexity of the design program often leads to problems during construction.

4.5 Lack of Quality Control

The quality of hospital engineering projects is directly related to the safety of patients and the normal operation of hospitals. If there is a lack of effective quality management during the construction phase, it may lead to safety hazards in later use. According to a survey, there has been a significant increase in environmental infections and patient mortality rates during hospital construction and renovation [8].

4.6 Low Fit between Construction Staff and the Healthcare Industry

The person in charge of engineering projects in hospitals not only needs a solid foundation in construction engineering, but also needs to master the characteristics of medical buildings. And often the level of hospital construction personnel can not meet the demand, it is difficult to combine professional and hospital buildings organically, which may lead to a disconnect between the design and the actual needs.

5. Hospital Engineering Project Management Optimization Measures

5.1 Optimization of Construction Solutions

The management should reasonably develop the construction management program, make a detailed progress plan, and reasonably arrange the construction time to ensure that the project is pushed forward on time. In addition, advanced construction technology should be used as much as possible to minimize the impact on the normal operation of the hospital. It is crucial to set up the construction period of each phase reasonably in the project plan and leave a certain buffer time considering the impact of unforeseen factors.

5.2 Communication and Coordination Optimization

Project managers should establish a clear channel of communication to ensure that there is an open exchange of information between the various parties involved. This includes holding regular meetings to discuss project progress, solve problems, and make timely adjustments to the project plan. At the same time, doing a good job of preliminary research, conducting detailed demand research in the early stages of the project, and organizing multi-stakeholder talks to ensure that the views of all parties are fully listened to is the key to avoiding this difficulty.

5.3 Quality Control Optimization

Project managers should ensure that the construction meets the relevant building codes and regulations, which is the basis for ensuring the quality of the project. At the same time, the managers should carry out regular inspection of the project quality to find and solve the existing problems in time. Finally, managers should ensure that the construction unit has the appropriate qualifications and experience to improve the quality of the project. When selecting construction units, their qualifications and past performance should be strictly examined. Management personnel should conduct environmental risk assessments and ensure quality control.

5.4 Professional Synergy Optimization

Before the commencement of the construction

drawing design, do a good job of professional synergy, clarify the design cooperation requirements of the respective professions, sort out the influence between the professions as the basis and conditions of the construction drawing design. In the construction project, each specialty should increase the frequency and quality of communication, early discovery of cross-construction conflict points, so as to effectively solve. In addition, with the rapid development of artificial intelligence and digital technology, BIM technology [9] and digital building platform [10] can be utilized to assist various professions and achieve accelerated collaboration.

6. Conclusion

The management of engineering projects in hospitals is a complex and critical process that involves multiple aspects such as the design, construction, and acceptance of hospital buildings, directly affecting the future operational efficiency and service quality of the hospital. Overall, project management in hospitals is a significant challenge for management personnel. The ideas proposed in this article can serve as a reference for future hospital engineering management personnel.

Acknowledgments

This paper is supported by [Wenzhou Municipal Science and Technology Bureau] under Grant Agreement No [Y20240959].

References

[1] Xuxu, X., Y. Xinglin, and Z. Haibo, Exploration on Architectural Characteristics and Construction Concept of Modern Hospital. Urbanism and Architecture, 2019.

[2] Anan, I., A Comparative Analysis of the Spatial Design Perspective of Wayfinding: The Emergency Room as a Case Study. Buildings, 2025. 15.

[3] Lei X; Liu YL; Xu M and et al. Analysis on Ventilation Design of the Negative Pressure Isolation Rooms in Wuhan Leishenshan Hospital. in International Conference on Computer Science, Engineering and Education Applications. 2023.

[4] Chaiseri, P. and T. Issariyarutthanon, Project Management for the Out Patient Department Building-Planning for Hospital Design and Construction. 2021.

[5] Yang YW, Yang HT, Li QF and et al., Simulation Study on Airflow Organization and Environment in Reconstructed Fangcang Shelter Hospital Based on CFD. Buildings (2075-5309), 2023. 13(5).

[6] Soria, C.S., Power Outage. 2024: Power Outage.

[7] Xieliang, P., Analysis of hospital engineering electrical construction practice merit and its effect. Fujian Architecture & Construction, 2017.

[8] Grosskopf, K.R. and E. Mousavi-Rizi. Environmental Infection Control during Hospital Construction and Renovation. in International Conference on Indoor Air Quality and Climate. 2016.

[9] Papamanolis, A., BIM-Based Machine Learning Application for Parametric Assessment of Building Energy Performance. Energies, 2025. 18.

[10] Lapo, L. and S. Viegas, Leveraging digital platforms to improve Public Health in hospital smart buildings. European Journal of Public Health, 2024(Supplement_3): p. Supplement_3.