

“Analysis of Maintenance and Repair Work in Residential Building”

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Abstract -Building defects are common phenomena especially for those old residential apartments. Lack of management in maintenance is one of the factors which is the reason for poor building condition. Despite the authorities in charge of building maintenance, the residents are also a factor contributing to poor maintenance on building.

Misusing the facilities, poor management team, insufficiency of fund for maintenance, the use of poor-quality material by the maintenance department, improper maintenance strategy often cause maintenance to achieve a result less than expected.

The aim of this research is to assist clients and customer in improving the maintenance quality in India. This study introduces to the fundamental concepts of construction management, with emphasis on increasing the efficiency and quality of residential building with the help of mobile application. Research study on building maintenance is used as literature review to figure out a feasible or not for maintenance of residential building in this research.

Certain key considerations and problems that are faced are highlighted so as to broaden the understanding of the subject. The investigation represents an exercise in performing the essential tasks that constitute a preliminary budget and plan. The conclusions include observations and suggestions that need to be considered while attempting such a job in practice.

This research focuses on how we can enhance the quality and accelerate the time required to get the work done.

The use of MEP consultant can improve the efficiency of quality and duration of the work,

as MEP layout enable user to have a quick access to reason of the problem before developing into a major issue, deciding upon the service provider to hire based on the ratings, scheduling according to user's convenience, giving an intimation of cost of the service user will have to bear.

Keywords : Repair, Maintenance, MEP, Residents, Delay and Consultant.

INTRODUCTION

Now a days, construction activity is the second largest activity in the world. This construction activity provides largest economy to the country and helps in development of the country and provides important role in urbanization, development of economy and standard of living of peoples.

Maintenance is the process of ensuring that buildings and other assets can retain a good appearance and operate at optimum efficiency. Inadequate maintenance can result in decay, degradation and reduced performance and affect health and threaten the safety of users, occupants and others in the vicinity.

Data collected from respective sites are analysis through relative importance index and it helps to find out the major repair work post possession of the residents. The emergence of maintenance application can improve the efficiency of quality and duration of the work, as mobile applications enable user to have a quick access to services provider available, deciding upon the service provider to hire based on the ratings, scheduling according to user's convenience, giving an intimation of cost of the service user will have to bear.

1. RESEARCH OBJECTIVE

This research aims at concluding whether a mobile application is feasible or not for repair and maintenance of residential building. To achieve the aims,

Objectives have been identified as follows:

- To study the type of repair and maintenance are to be made in residential building.
 - Thorough data collection regarding maintenance and repair of residential building.
 - To study the various reasons for no approach toward MEP.
- Collect data through survey or questionnaire.
- Analyse the data for repair and maintenance.

2. PROBLEM STATEMENT

Many occupants in residential projects in various parts of the city are often running into difficulties in resolving maintenance and repair works. So, it sometimes results in an increase in time and unknown costing of the repair work. Many a Previous case studies had been shown the various factors and methods to minimize the maintenance issues faced by the residents but still these issues sometimes are delayed to achieve a solution due to various reasons. It indicates that there is either lack of awareness of the suggested construction practices or there are limitations for the effective adoption of their suggestion. It may vary from each case study of the construction projects.

Maintenance can help:

- Prevent the process of decay and degradation.
- Maintain structural stability and safety.
- Prevent unnecessary damage from the weather or from general usage.
- Optimize performance.
- Help inform plans for renovation, refurbishment, retrofitting or new buildings.
- Determine the cause of defects and so help prevent re-occurrence or repetition.
- Ensure continued compliance with statutory requirements.

Therefore, it is necessary to give attention on the effectiveness of building maintenance practices and repair time to time.

3. SCOPE OF RESEARCH

The Project scope is to research beneficial for organization therefore targeted at providing effective solutions to the following:

- To help to understand the necessity of building maintenance.
- To improve Professionals for the efficient & effective way to maintain infrastructure.
- To give solutions on how to maintain a building
- To give solutions on the criticality of Poor maintenance & approach.

4. JUSTIFICATION FOR THE RESEARCH

The literature study identified that various issues and effects of poor maintenance and delay in the repair works of buildings. and these studies are based on questionnaire survey and interview technique to find out most contributing factors that cause a delay in the maintenance and repair of a structure. Above literature studies showing the rank importance of those factors by analytical means with the help of relative importance index method and showing the need for proper maintenance and different methods feasible for it.

5. LIMITATIONS OF THE RESEARCH

After the recognition, many works of research had certain limitations. For that research, there is small investigation relating to residential construction projects in Pune city areas and mainly focused on the only residential projects in Pune city areas and which are belonging ascertain cost range of that projects. Data collected from respective site is taken as confidentially and data of the construction projects collected from respective sites only.

6. RESEARCH METHODOLOGY

Initially, review of literature is made to know the factors and groups of delays in construction projects and this factor are classified according to their groups and questionnaire survey format is made. This questionnaire survey format is carried forward to receive feedback from experts in construction projects like contractors, owners and consultants, etc.

7. DATA COLLECTION

In that, data of the questionnaires survey is carried through the construction project of the Pune city through visiting their particular sites and got responses from the survey and further they are classified according to sampling methods. A questionnaire is sent to the owners of 50 residential project of Pune city area and an another one is sent to Two MEP consultants. This questionnaire is completed through respective response of the residents and MEP consultants. The above questionnaires devised with the help of the project manager focusing on parameters of cost and time.

8. DETAILS ABOUT THE SELECTED CONSTRUCTION PROJECT

After the convenience sampling study of section, A of questionnaire survey, according to specific interval study with help of site manager as a type of respondent for exact price and time that should have been taken,

Sr. No.	Project Name
1.	Nano Homes, Ravet, Pune.
2.	Anshul Ballina, Ravet, Pune.
3.	Golden Paradise, Ravet, Pune.
4.	Vakratund Aaditya Terraces, Ravet, Pune.
5.	Jagtap Nano Spaces, Ravet, Pune.
6.	JAS Arihant Heights, Ravet, Pune.
7.	GK Royalee Hills, Ravet, Pune.
8.	Runal Spacio, Ravet, Pune.
9.	Lotus Laxmi, Ravet, Pune.
10.	Shankeshwar villa, shindewasti, Pune.
11.	Silver Palm Grove, Ravet, Pune.
12.	Little Earth, Ravet, Pune.
13.	Park Titanium, Wakad, Pune.
14.	Seville, Wakad, Pune.
15.	Icon Linera, Wakad, Pune.
16.	Dynasty Phase 2, Wakad, Pune.
17.	Ethos Phase 2, Wakad, Pune.
18.	Akshar Elementa, Wakad, Pune.
19.	Apex Athena, wakad, Pune.
20.	Kalpataru Harmony, Wakad, Pune.
21.	Costa Rica, Wakad, Pune.
22.	Yashadas Panache, Wakad, Pune.
23.	Mont Vert One, Wakad, Pune.
24.	Opus 77, Wakad, Pune.
25.	Kasturi Epitome, Wakad, Pune.

26.	Sapphire Park Street, Wakad, Pune.
27.	Capital Tower, Shankar Kalat Nagar, Pune.
28.	DNV Elite Homes, Wakad, Pune.
29.	Rohan Tarang, Wakad, Pune.
30.	Silver Skyscapes, Wakad, Pune.
31.	Park Royal, Wakad, Pune.
32.	Life Ville, Pimple saudagar, Pune.
33.	Laxmi Angan, Pimple Saudagar, Pune.
34.	Kunal Icon, Pimple Saudagar Pune.
35.	Kingston Avenue, Pimple Saudagar, Pune.
36.	Tamara, Pimple Saudagar, Pune.
37.	Sai Vision, Pimple Saudagar, Pune.
38.	Crystal Park, Pimple Saudagar, Pune.
39.	Atul Alcove, Pimple Saudagar, Pune.
40.	24 Glitterati, Pimple Nilakh, Pune.
41.	Sagar Waters Edge, Pimple Nilakh, Pune.
42.	Neco Skypark, Pimple Nilakh, Pune.
43.	Ovhal Spring, Pimple Nilakh, Pune.
44.	Shriram Plaza, Pimple Nilakh, Pune.
45.	Sahil Heights, Pimple Nilakh, Pune.
46.	Aditya Comfort Zone, Aundh, Pune.
47.	Royal Orchard, Aundh, Pune.
48.	West End River View, Aundh, Pune.
49.	Kumar Prerana, Aundh, Pune.
50.	Twin Towers Apartment, Aundh, Pune.

9. Details about the selected MEP consultant

VK: e Environmental

Shreeya Consulting Engineers

10. RECOMMENDATION

- Many residents in Pune city are often running into troubles regarding cost and time due to inefficient reach to services.
- **Problems faced due to inefficient services**
 1. Damage to the structure.
 2. Delay in repair.
 3. Unknown charges.
 4. Extensive research required to get issues resolved.
 5. Building defects are common phenomena especially for those old residential apartments.
 6. Lack of maintenance management is one of the key factors which lead to poor building condition.
 7. From the study, it is observed that most repair and maintenance was delayed because:
 8. Difficulty in approaching the right person for the repair.
 9. Unavailability of repairman.
 10. Complex repair work.
 11. Inconvenience in accessing to the maintenance man.
 12. No knowledge about the cost of the repair.
- Many Previous case studies had been shown the various factors and methods to increase the maintenance alertness.
- The MEP engineer is the most crucial part of any construction project. There is a specialist who works as an MEP Engineer or MEP consultants. To carry out all the related MEP works these people are responsible for overall mechanical, electrical, and plumbing works. Without which construction project could not complete.
- The main task of the MEP engineer is to work on the MEP design to complete the MEP works for the time in any construction projects. MEP Revit software is used to carry out the details of MEP activities.
- **Detailed Scope of Work of MEP**

Preparation of detailed load calculations, design basis, capacities, layouts, space plans, BOQ for following Building Engineering Services:

2.1 Water Supply network & plumbing services, which will include the following:

- Cold and Hot water systems
- Water treatment plant
- UGWT, OHT and pump rooms
- Water supply and external distribution
- Solar Hot water system (if required)
- Hydro-pneumatic system (if required)

2.2 Sewerage network design & Wastewater Treatment solutions, which will include the following:

- Flushing water systems
- Soil, Waste, Vent piping
- Sewage up to STP and disposal system
- Sewage treatment plant (if required)

2.3 Stormwater network design & Rainwater harvesting / reuse solutions

- Storm water disposal up to Nala / disposal system
- Rainwater harvesting recharge / reuse system

2.4 Electrical Systems design, DG sets and Renewable Energy Installation Design

- HT distribution, substation and D.G sets
- Earthing and lightening protection
- MV distribution board and cables
- Point wiring (MV & LT)
- Electrical fixtures and accessories
- Design of Low Voltage Systems, such as TV, Telephone and Data, Fire Alarm and Detection, CCTV, Access Control and PA system
- Control/Monitoring of various equipment's through IBMS.
- Renewable Energy Systems, PVs (if required)

2.5 Fire Suppression System Design

- Wet riser hydrant systems
- Fire ring mains and external hydrants
- Pumps and accessories
- Sprinkler System
- Extinguishers

2.6 HVAC System Design

- Basement Ventilation System
- Split Air Conditioning Provisions
- Staircase and Lift-well Pressurization (If required)
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- Out of the sample set majority of the people would opt for a mobile based repair and maintenance application.
- This method is more organized and hassle-free method of procuring residential repairs and maintenance services.
- Various MEP apps are also helpful in the construction to carry out the MEP work.
- The Future of India is digital and it is constantly booming.
- At present a specific application for these services is not functioning in India.
- This type of application can reach out to majority of the urban population who faces difficulty to resolve such issues, hence the scope/potential of growth is better.

crack issues, 8% of painting issues and 5% of fabrication issues.

- While 69% of residents took 2-6 days to have get it repaired while 31% took a 7-10days.
- Every resident paid eventually more for the services as they were unaware of the exact charges for the services Because of the unavailability of a proper resource to know about such services.
- 54% of the residents came to know about the service provider through friend and other associates, while 25% from the internet,14% of the residents contacted the project developer team for such repairs and maintenance and rest of the 7% approached via advertisement.
- 94% of the sample size have not come across any specific application for these services, whereas 6% of sample size have come across an application like URBAN CLAP who's forte is not repair and maintenance services but it provides a few services.
- 41% knew the type of services provider to approach rest of 40% were not sure about it while the 19% knew nothing about hence 31% of the residents faced a lot of difficulty while 24% found it quite difficult,27% few difficulty and 18% found no difficulty at all to the repair work done.
- The cost Factor majorly affects the MEP.
- The Average cost of a MEP consultant through the study can be calculated as **3% of the overall project cost**
- The cost of MEP consultant can vary from project to project.
- Various factors affect the cost such as type of structure, complexity of the project, type of materials to be used, type of equipment's to be used.
- As the study concludes that MEP consulting cost adds a very little cost to the overall project.
- Yet construction companies don't opt to increase their cost of construction. Hence, they try to neglect the MEP services. But it turns out to be more beneficial for the project.
- As the MEP is effective during construction it also its efficient form repair and maintenance as the layout provided by the consultant can help for a better way to figure the issue.
- MEP is more feasible for a long-term view as it reduces the maintenance cost by helping to identify the issue at start.
- MEP (Mechanical Electrical and Plumbing) Consultant is a better option as is 3 largely benefits:

11. CONCLUSION AND DISCUSSION

- Ranking of maintenance problems:

Table 6.1 Ranking Order of problems Faced:

RANKING ORDER	PROBLEM TYPE	PERCENTAGE OF TOTAL
1	ELECTRICAL WORK	27 %
2	PLUMBING ISSUE	34%
3	TILING WORK	15%
4	STRUCTURAL ISSUE	10%
5	PAINT ISSUE	8%
6	FABRICATION ISSUE	5%

- General observation for maintenance and repair for electrical and plumbing is due to improper installation of fitting and quality of material and poor construction.
- The survey carried out at 50 residential projects. With the help of above Questionnaire shows that most of the maintenance issues that were faced consisted of 27% of electrical work, 34% of plumbing issues, 15% of tiling work, 10% of wall

1. Improve Your Bottom Line

Heating, ventilation, and air conditioning (HVAC), lighting, plumbing, energy consumption and safety solutions are all elements that can impact the bottom line. Professional MEP consultants help owners achieve optimal building performance by maximizing energy efficiency, reducing redundancies and designing integrated, synergistic systems from the start.

2. Optimize Energy Efficient Designs

Every commercial building project presents its own unique challenges. MEP engineering consultants provide customized solutions to improve a building's (new or existing) energy efficiency. Through energy modelling, a virtual simulation of a building's energy usage, MEP consultants understand the current energy consumption, make predictions on future consumptions and optimize designs to maximize efficiencies.

This can be across systems, including a combination of high-efficiency HVAC equipment, lighting retro-fits, LEED designs, photovoltaics, or other resource efficient and eco-friendly designs.

3. Reduce Project Risk

Risk reduction, fast turnarounds, and cost control are essential for a successful building project. Modern construction and building renovations involve multiple, complex systems. If these systems are designed in isolation, it can lead to project delays and inflated costs.

- MEP consultants collaborate with all project team members to improve communication, ensure code compliance and avoid delays.
- When designing building systems, an integrated MEP engineering approach yields better results than specifying each building system in isolation. Interactions between building systems can be especially difficult to coordinate when the design process is isolated, and equipment location conflicts are very likely.
- Hence proper MEP Consultant is required for quality construction and to avoid frequent number of maintenance issue in future.
- Mobile applications can be a solution for the repair and maintenance in the the near future.
- Hence it is necessary adoption of new technology-based module in civil industry which has a brighter future and makes such services easily accessible.

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