CHAPTER 32

Challenges in MEPF Services in Retail Store Setup: A Case Study Approach

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ABSTRACT

Purpose: The study inquiries into the Mechanical, Electrical, Plumbing, and Fire (MEPF) related challenges in mall retail stores during their time of set up and assesses their impact by project life cycle stages. This approach aims to address the multifaceted nature of MEPF challenges, which further contributes to the reduction of project efficiency, safety, and sustainability in the set-up of retail malls. *Methodology:* This study is based on observations and in-depth interviews during site visits to assess existing MEPF set up in malls that were coming up in the cities of Pune, Navi Mumbai and Bengaluru. Observation and analysis during these visits have unveiled a spectrum of challenges. Subsequently, interviews with industry professionals, consultants, facility managers, and retail store managers, have provided insights into the root causes and impacts of these challenges. Identified issues have been categorized and thematically grouped by project life cycle stages, enabling a holistic understanding of their interrelationships, thus aiding the process of addressing them effectively. *Findings:* The findings show that critical challenges in setting up MEPF systems in malls include inadequate ventilation, electrical malfunctions, plumbing leaks, and fire safety concerns which have a substantial influence on cost and time overruns. *Research Limitations:* The case study method enables one to draw a cause-effect relationship within a limited environment. Although the method adopted has enabled the researchers to examine complex issues in MEPF services with a closer lens, further studies may be performed in different contexts and with a wider audience to strengthen the findings hereunder.

Keywords: MEPF services; Retail stores; Sustainability.

1.0 Introduction

In the dynamic landscape of the construction industry, projects are frequently marred by challenges that disrupt timelines and inflate costs. Time and cost overruns are issues that have significant implications for stakeholders, affecting project outcomes. Despite advancements in project management methodologies and technological innovations, these overruns remain a persistent problem, leading to delays, increased financial burdens, and compromised quality.

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In the competitive world of retail, the timely and cost-efficient setup of new stores is critical for business success and market penetration. Inefficiencies in project set up are mainly characterised by time over runs and cost overruns. These overruns can lead to delayed store openings, increased financial burdens, and missed revenue opportunities, ultimately impacting the overall profitability and operational efficiency of the retail business.

This leads us to our research questions as stated below:

RQ1: What are the MEPF related challenges that lead to project inefficiencies in the setup of mall retail stores at various project life cycle stages?

RQ2: What is the effect of MEPF related challenges in setup of mall retail stores?

RQ3: At which stage of project life cycle do most MEPF related challenges occur?

RQ4: What improvements to project framework would address MEPF related challenges in mall retail store set up?

Project management theory outlines a structured approach to managing projects effectively, ensuring that objectives are met within the constraints of time, cost, and quality. The stages of project management are typically divided into five key phases, each with distinct activities and deliverables as below.

Figure 1: 5 Phases of Project Management Process

Source: PMBOK guide

The initiation stage is when the business case is developed and a charter is designed to define the project, identify the site of mall set up and create the project partners. In the planning phase, detailed plans are created to guide the project. This includes defining the project scope, breaking down the project into manageable tasks using a work breakdown structure, and developing a detailed schedule with milestones and deadlines. Resource and budget planning are conducted, potential risks are identified, mitigation strategies are devised, and a communication plan is established to ensure effective information flow.

The execution phase involves implementing the project plans, assigning tasks, and managing the project team to maintain motivation and adherence to the plan. Progress is tracked, quality assurance measures are implemented, and regular communication with stakeholders is maintained. Monitoring and controlling run concurrently with execution, focusing on tracking project performance through key performance indicators and metrics, identifying and analysing variances, managing changes, addressing risks, and ensuring quality standards. Regular status reports are provided to stakeholders. The closing phase finalizes all

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project activities, completes and hands over deliverables, gathers feedback, documents lessons learned, closes contracts, releases resources, and celebrates the team's achievements. This structured approach ensures efficient and effective project completion.

2.0 Method

For this study, the Eisenhardt Method of using comparative cases to study the same focal phenomenon was applied (Eisenhardt, 2021). This entails careful selection of cases where a focal phenomenon has occurred. In this case the focal phenomenon is time and cost overruns in retail mall set up due to MEPF related challenges. Further, common case design as suggested by Eisenhardt, 2021 is used across settings to find the answer to our research questions. Through site visits to diverse malls, three cases were identified for study (Annex III for site images). The cities of Pune and Navi Mumbai in the west of India and Bengaluru in the south of India are known as information technology hubs of the country, thus attracting substantial younger population. This in turn has given rise to increased purchase power and emerging mall culture. Hence upcoming malls in the cities of Bengaluru, Navi Mumbai and Pune served as the ideal location for this study. Based on availability of extensive data and access to stakeholders for in depth interviews, three sites were chosen for the study. Care was taken to ensure that all the three sites had similar years of set up and were of small, medium and large sizes, so that cross case comparison was possible.

#	Size (in Sq. feet)	Year of set up	Number of floors	Profiles of persons interviewed
Case 1	3,25,000	Late 2023	3 floors	Facility Managers, Engineers in Charge, Store Managers, design consultants.
Case 2	11,098	2024	1 floor	
Case 3	4,792	2024	2 floors	

3.0 Data Collection

Each of the sites were visited in person by one member from the research team. The fourth member was kept away from the data collection stage as the team needed a non-parsimonious view of the interview outputs and its analysis. This ensured that every piece of information collected during the course of the case was analysed by two independent sets of researchers. The findings on set of challenges were divided by project life cycle phases in order to answer RQ1 and RQ2. In order to keep the identity of the retail malls anonymous, they are named as case 1, case 2 and case 3. Details can however be obtained by contacting the authors. Excerpts from the interviews and analysis are presented hereunder case wise (See Annex 1 for interview questions and Annex II for excerpts from interview responses).

3.1 CASE I

Problem 1: Inadequate Water Drainage System (Planning)

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The design specified an open roof, yet lacked a proper water drainage system, leading to flooding in the underground parking area.

Problem 2: Delays in Bill Approval Due to Hierarchical Issues (Monitoring and Controlling)

The bill approval process experienced delays due to hierarchical issues within the organization. The complexities and inefficiencies in the internal approval process significantly delayed the passing of the bill, adversely impacting the overall project timeline.

Problem 3: Structural Compromises Due to Initial Mall Design (Initiation and Planning)

The initial design of the mall segmented the building into three parts, which compromised the quality and overall finish of the structure.

Problem 4: Delays in Delivery of Long Lead Items (Execution)

Long lead items were not delivered before the commencement of on-site work, causing delays in the construction schedule.

3.2 CASE II

Problem 1: Miscalculated Beam Height (Planning)

The absence of a site visit by the Design Team led to an incorrect calculation of the beam's height. Subsequent structural surveys necessitated multiple revisions to the HVAC plan, resulting in five alterations to the design layout. This caused significant time and cost overruns due to the need to reorder fitments and adjust plans, ultimately delaying the store's operation.

Problem 2: Absence of Service Lift/Passage (Initiation and Planning)

The mall authorities did not provide a dedicated service lift or passage. As a result, all loading and unloading of materials had to occur through the main passage, negatively impacting the company's image.

Problem 3: Delay in Drawing Approval (Execution)

The approved drawings were not promptly communicated to the execution team, leading to periods of inactivity and uncertainty regarding their tasks.

Problem 4: Revisions in Firefighting Drawings (Execution)

During the execution phase, the firefighting drawings required revisions due to initial miscalculations in design parameters, further complicating the construction process.

Problem 5: Miscommunication Regarding Material Quality *(Monitoring and Controlling)*

Significant miscommunication led the execution team to use plywood for cladding according to the drawings. However, the quality team erroneously asserted that the plywood was expired, necessitating its removal and replacement. This caused a 17-day delay, and subsequent investigations revealed that the plywood was not expired.

3.3 CASE III

Problem 1: Drawing Discrepancies Identified by IT/SLP Team (Planning and Execution)

The IT and Security Loss Prevention (SLP) teams observed discrepancies in the drawings, including mismatches between equipment and cable tray locations. These

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inconsistencies necessitated last-minute changes to the layout, resulting in repeated work and delays in project completion.

Problem 2: Delay in Pre-Construction Site Visit Drawings (Planning)

There was a significant delay in providing pre-construction site visit drawings to the design team, which in turn delayed the issuance of Good for Construction (GFC) drawings.

Problem 3: Deviation in Design BOQ vs. As-Built Drawings (Execution and Monitoring and Controlling)

Discrepancies between the Bill of Quantities (BOQ) in the design phase and the as-built drawings led to cost overruns.

Problem 4: Incomplete Skirting and Painting Work Post Closure (Closure)

Skirting and painting work remained incomplete after the project closure, impacting the store's final appearance and readiness.

Problem 5: Incomplete Grouting Work Leading to Water Seepage (Closure)

Grouting work for ducts on the outer wall was not completed even after project closure, causing water seepage inside the store and further complicating the post-construction phase.

Problem 6: Delays due to statutory compliances (Planning and Monitoring and Controlling)

The construction process experienced delays due to the need to adhere to various statutory compliances. These regulatory requirements necessitated additional approvals and inspections, which extended the overall timeline of the project.

4.0 Analysis and Findings

In reviewing the challenges from the three case studies, it becomes evident that the planning phase exhibits the highest frequency and impact of issues, fundamentally affecting subsequent project stages. For instance, inadequate water drainage systems and miscalculated beam heights are indicative of insufficient initial site assessments and design validations. Such oversights lead to significant downstream disruptions, requiring multiple revisions and causing delays and cost overruns, irrespective of the mall size.

Additionally, delays in providing pre-construction site visit drawings and discrepancies between the Bill of Quantities (BOQ) and as-built drawings further underscore the planning phase's critical role in project success. These issues highlight lapses in coordination and cost estimation, which are essential components of effective project planning. When initial planning is flawed, the execution phase is often plagued by inefficiencies and corrective actions, as seen in the need for revisions in design layouts and adjustments to project timelines.

5.0 Results and Conclusion

The recurring nature of these planning-related issues underscores a critical need for enhanced planning processes in construction project management. Comprehensive site

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assessments, accurate initial measurements, timely coordination, and realistic cost planning are fundamental to mitigating risks and ensuring project success. By addressing these planning deficiencies, projects can achieve smoother execution, better cost control, and timely completion. Ultimately, employment of professional consultants at the planning phase leads to higher quality outcomes and greater stakeholder satisfaction, as projects are delivered within scope, on time, and within budget. Further insights from in-depth interviews into what improvements to the project framework would help address the above identified issues revealed the following:

Timely Physical Inspections: In both Case 2 and Case 3 (mid-sized and small mall), the root cause of errors could be traced back to the absence of a thorough site visit by the design team. A physical inspection of the store space would have provided essential insights into existing conditions, such as ceiling heights, structural constraints, and potential obstacles. This firsthand knowledge would have enabled the design team to make more accurate calculations and adjustments to their plans before construction commenced. Moreover, the lack of a site visit hindered effective communication between the design team, construction crew, and the client. Misinterpretations of architectural drawings and specifications further exacerbated the issues encountered on-site, leading to frustration and additional delays.

Technology Integration: Usage of advanced technologies like Building Information Modeling (BIM) aid in resolution of drawing related conflicts, miscalculations, reorders due to structural changes and timely drawing approvals. In addition, experts also suggested the use of drones to review quality of work done at inaccessible places and address issues such as incomplete grouting, skirting and painting.

Enhanced Stakeholder Engagement: Diverse stakeholder engagement in the planning phase through Design LAB employed server supported by teamwork could allow multiple users to access data. Providing access from the project's initiation phase onwards to all stakeholders could avoid problems such as timely delivery of lead items, faulty initial mall design and delays due to hierarchical issues.

Risk Management Strategies: A risk management framework which combines it with Project life cycle is needed for better implementation of mall retail projects. Since these projects have very short life spans, the industry tends to overlook addressing risks at each life cycle stage. Yet, in spite of shorter life spans, the risks occur stage wise. Hence a framework to look at mitigating cost and time delays due to MEPF challenges by life cycle stages could help address issues such as flooding, irregular site visits and quality checks and uncertainty in tasks.

6.0 Limitations and Future Research Directions

The case studies discussed are limited to specific mall construction projects, which might not represent the full spectrum of challenges encountered in different types of construction projects. Other sectors such as residential, industrial, or infrastructure projects

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might face different issues and require distinct approaches. The study also did not consider external factors such as economic fluctuations, regulatory changes, or unexpected events like natural disasters, which can significantly influence the planning and execution of construction projects. The analysis primarily reflects the experiences of planners and project managers. It does not fully explore the perspectives of other stakeholders such as end-users, local communities, or regulatory authorities, who could offer valuable insights into the challenges and successes of the projects. Future research could include comparisons across various types of construction projects, such as residential, commercial, and infrastructure projects. This approach would help identify whether similar planning issues exist across different sectors and how they are managed. Incorporating quantitative data on project performance metrics such as timelines, costs, and resource allocation could provide a more detailed analysis of the impact of planning deficiencies. This data would be useful for developing models to predict and manage potential project issues.

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Annexure I: Interview Questions

1. What are the typical challenges faced in designing and implementing MEPF systems specifically for retail stores?
2. Are there any unique challenges compared to other building types?
3. How were these challenges identified and addressed in that case?
4. Which project management phase has a significant number of problems?
5. Major reason for cost and time overrun? On an average Range of percentage of cost variation.
6. What are the most common challenges you face regarding MEPF services in retail store setups?
7. How do these challenges impact operations and customer experience?
8. Risk which was not initially identified but later surfaced during execution?
9. Difference between retail store setup in a standalone building vs retail store in commercial setup in the project phase?
10. What are the problems faced while handing over the projects?
11. What are the most common challenges you face regarding MEPF services in retail store setups?

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12. How do these challenges impact operations and customer experience?
13. How do MEPF considerations integrate with other departments or stakeholders (e.g., design, construction, operations) in your current projects?
14. What strategies are employed to ensure effective collaboration and communication?

Annexure II: Excerpts from Interview responses

Case I:

"One of the primary issues was persistent waterlogging in the basement areas. During the monsoon seasons, the whole place would be flooded. So, tenants had raised concerns".

"There were wiring errors throughout the mall. So, we had to rewire the whole thing".

"The STP (Sewage Treatment Plant) had design flaws. We were not in control of it. We ended up being answerable for environmental concerns. Retrofitting needed to be done".

Case II:

"The scope itself was not defined clearly. The contractor says something, and the supplier contradicts…. finalising layout itself took up so much time".

"The design kept changing and this changed the budget of course. Unless that is done, how could we get the permits on time?"

Case III:

"Had the design team done an initial site visit, all those delays could have been avoided. They just went by drawings (the site team). Now so many critical issues got overlooked.

"Design team miscalculated beam heights for store layout. These are all structural issues and become worse as construction moves ahead. Cost revisions, timeline revisions. we have seen it all"

Annexure III: Site images

Case I:

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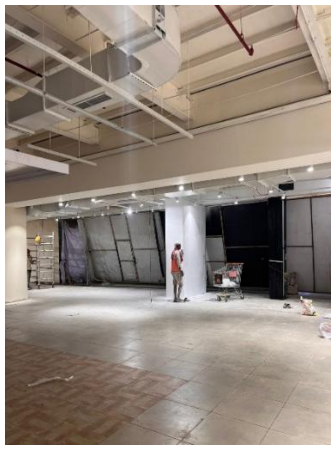
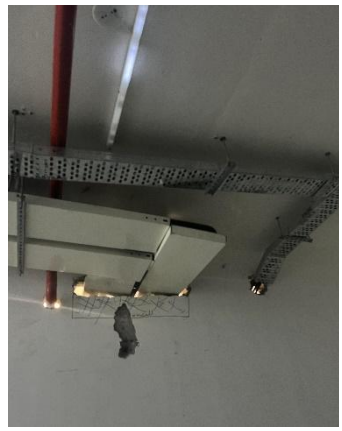
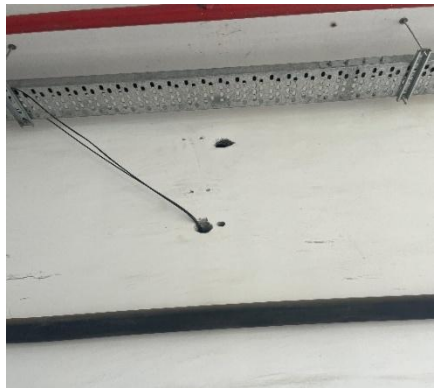
Case II:



Case III:



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