

Role of Project Coordination in Construction Projects

Case Study: Mahatma Mandir Convention Center 1A/1B

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Abstract— The wave of development has now proliferated across the country-India. In such times, the construction industry too has amalgamated itself in this chain of progress. Advancements are gaining widespread momentums. Projects need to fructify with a holistic approach. This calls for effective management and successful implementation of projects, one where there is no room for error. Project coordination is a tool which can be employed for attaining better and effective results in project success. This study, through the instance of a complex and multifaceted project- Mahatma Mandir Convention Centre, establishes the need and role of project coordination. It also exemplifies how successful coordination is a boon in the entire project life cycle. Lessons learnt from this can be integrated in other projects thereby aiding in execution, operation and successful implementation of the project.

Keywords— *Project Coordination, bid process management, design changes, approvals, billing and escalation, extension of work*

I. INTRODUCTION

Project is an organized unit dedicated to the attainment of a goal- the successful completion of a developed project on time, within budget, in conformance with pre-determined programme specifications. It can be defined as a temporary endeavor which is designed to achieve a set of goals such as a product or service which has a definite beginning and end and is typically undertaken to obtain some benefit or to add value. Recent advancements have made it possible to now undertake complex and technologically intense projects. Deployment of project management strategies aid in such undertakings (Encyclopedia of Management, 2000)

Project management is an organized venture for managing projects. It involves scientific application of modern tools and techniques in planning, financing, implementing, monitoring, controlling and coordination of unique activities to produce desirable outputs in accordance with the predetermined objectives within the constraints of time and cost. Project coordination is one such vital tool, which provides effective management amongst the various components of the project. (Nagarajan K, 2007) Project coordination is a tool which can be employed for attaining better and effectual results in project success

Modern construction industry is a multidisciplinary field wherein various component together aim for project success. This necessitates the need for the stake holders to exist symbiotically and have a synergic relationship with each other. A typically large construction project needs to have

synchronization among its various departments such as civil, finance, MEP, Human resource (HR), design etc. Further, there are multiple players such as designers, consultants, contractors, sub-contractors, specialists etc. belonging to different disciplines. All this makes coordination more complex. The project manager alone will not be able to handle the workload and will be drained. Moreover, he will not be able to invest his resources on other much important issues. In such cases, the role of project coordinator becomes crucial. This study, through the instance of a complex and multifaceted project- Mahatma Mandir Convention Centre, establishes the need and role of project coordination and how successful coordination is a boon in the entire project life cycle.

II. NEED FOR THE STUDY

A. *Need for the Study*

The success of the project is the chief aim of any project. Co-ordination plays an important role in this success parameter having considerable effect on the outcome of a construction project. Despite this, projects tend to fail or fall short in success. This leads to the need of studying the coordination techniques, the current issues and methods to improve them. Coordination can be seen as a process of managing resources in an organized manner so that a higher degree of operational efficiency can be achieved for a given project. (Hossain 2009)

B. *Objective of the Study*

Objective of this study is to identify the project coordination tasks involved in all the stages of the project life cycle of Mahatma Mandir phase 1A/1B and to determine the level of efforts required to achieve the coordination goals for the issues enlisted in the pre/during/post construction phases.

C. *Scope of the Study*

The study is restricted to Mahatma Mandir Convention Center- 1A/1B, Gandhinagar keeping in view the Professional Advisor's scope. This study focuses on formulating a matrix consisting of five major issues faced in pre-during-post construction coordination activities on which in-depth study and analysis is carried out. Opinions survey and qualitative interview is then carried out with the Client, Contractor and Professional Advisor on these issues to validate and to know the level of coordination efforts required to achieve the coordination goals for these issues.

D. Limitations of the Study

The study conducted is a project specific study. Qualitative interview and opinion survey is through responses of personnel from Client, Contractor and Professional Advisor and it reflects their perspective based on their experience.

E. Research Methodology

Through literature study five major coordination goals were identified. From the study of Mahatma Mandir Convention Centre, coordination tasks which occurred during the life cycle were enlisted and were classified in these goals. Major tasks which impacted the project and in which a high level of coordination efforts was required were then studied in depth. The nomenclature followed for these tasks are 'issues'. The research methodology adopted for this paper is as follows:

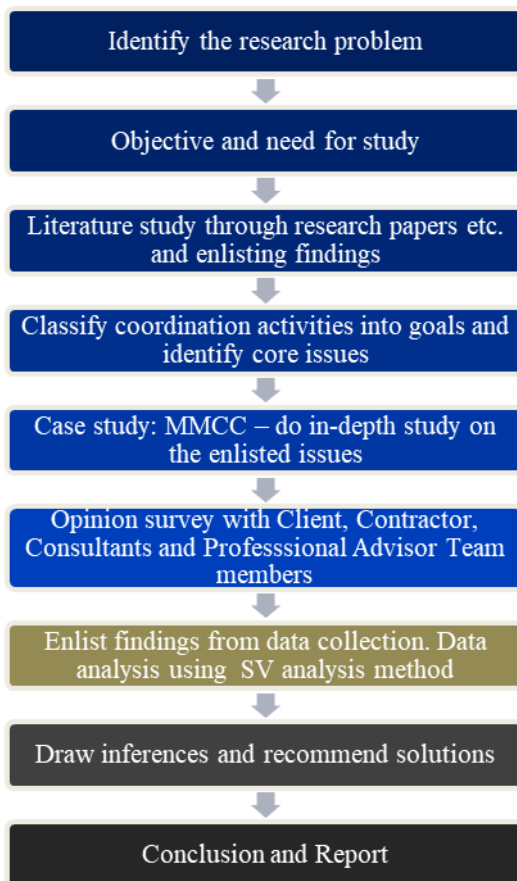


Fig. 1. Research Methodology

III. CASE STUDY: MAHATMA MANDIR PHASE 1A/1B

Mahatma Mandir Convention Centre is an iconic building constructed in the honor of The Father of Nation, Mahatma Gandhi in the Capital City of his home state, Gujarat. Mahatma Mandir is strategically located as the gateway to Gandhinagar – enhancing the capital's characteristic central vista as an entry node leading to the assembly complex in one way and as a new connect to the future. The complex is spread over 60,000 m². Mahatma Mandir draws inspiration from the life and philosophy of The Father of the Nation. It is planned as a state-of-the-art complex with various modern facilities for hosting events

such as conferences, seminars and exhibitions at the national and international level. Mahatma Mandir also serves as a tourist destination to connect future generations to the inspiring life path of Mahatma Gandhi. The Government of Gujarat commenced planning in the year 2009. The foundation stone was laid during Swarnim Gujarat Celebrations (Golden Jubilee Year of formation of separate state of Gujarat).

Major parameters of study are:

- Study of bid process management
- Study of design changes
- Study of approvals
- Study of billing and escalation
- Study of extension of works-1B

A. Issue 1: Bid Process Management

The study of bid process management included study of the contractor's and PMC's tender, bidding process, initial and detail screening, technical and financial bid, concept presentation and final selection. The contractor is called for an EPC work on turnkey basis for Business Centre and Exhibition Centre. The method of selection adopted was QCBS- Quality 60% (technical-10% and concept presentation-50%) and Cost 40%. A minimum 75% was required to be qualified. In total 11 bidders were responsive and it was a healthy competition. The initial screening comprised of average annual turnover (within the last 3 years), general experience (within the last 5 years) and specific experience in which only 4 bidders qualified. The detailed screening consisted of a) Financial stability/capability-38 marks b) Technical capability-18 marks c) Experience-44 marks. Only 3 bidders qualified for concept presentation after obtaining minimum 75% as required. The concept presentation (50%) had criteria such as optimizing land utilization, built to open ratio and connectivity, structural clarity and meaning etc. which was judged by experienced personnel from client and Professional Advisor's team. Contractor 'E' obtained highest marks. In the financial bidding (40%), contractor 'E' bid ₹135 Cr. and in the combined evaluation was the H1 bidder and was hence awarded the work.

The PMC's method of selection adopted was QCBS- Quality 70% (technical-20% and concept presentation-50%) and Cost 30% A minimum 75% was required to be qualified. In total 2 bidders were responsive. The eligibility criteria comprised of being PMC to Govt./Semi-Govt. (>7 years), average annual turnover (3 years, > ₹3 Cr.) and similar experience work (5 years, > ₹20 Cr.) The detailed screening consisted of a) Qualification of the proposer-35 marks (overall experience, average annual turnover, and similar work experience) b) Approach and Methodology-15 marks c) Personnel-50 marks. Both bidders qualified for concept presentation after obtaining minimum 75% as required. The concept presentation (50%) had criteria such as overall experience of work/similar type of project, maximum volume of work handled, understanding of the objectives of the project etc. which was judged by experienced personnel from client and PA's team. PMC 'A' obtained highest marks. In the financial bidding (30%), contractor 'A' bid ₹1.23 Cr. and in the combined evaluation was the H1 bidder and was hence awarded the work.

B. Issue 2: Design Changes

The study of design change included collection of all the changes which occurred in the course of the project such as location, site layout etc. A major change was the location change which occurred thrice (Science city → Helipad → Central vista) and consequently the area was changed (30419 m² → 41113 m² → 39905 m²). This led to BOQ changes. (₹135 Cr. → ₹193Cr. → ₹233 Cr.) Other changes included orientation change (E.g. building length elongated from 132 m to 170 m), design philosophy change (from textile industry to Gandhian philosophy), cladding change (sand stone converted to precast panels), roofing system change (concrete sheeting to natural grass turf) etc.

C. Issue 3: Approvals

The study of approvals included study of method, (135 Cr. → ₹193Cr. → ₹233 Cr. → ₹206 Cr.) BOQ items changed, variations, reasons for change etc. Contractor was selected based on the price bid of ₹135 Cr. However, due to location change, BOQ amount was revised to ₹193 Cr. Incorporating other changes such as addition of exhibition hall- 3 etc. the amount finalized was ₹233 Cr. The BOQ was divided into 3 parts a) Pre-Construction Costs- i) Design and preparation of drawings ii) Survey and Soil Investigations b) During Construction Costs- i) Civil works ii) Architectural works iii) Interior works iv) Furniture v) Road works vi) Landscape vii) Electrical works viii) Renewable energy system ix) HVAC works x) Firefighting works xi) PHE works c) Post Construction Works- i) Electrical works ii) HVAC works iii) Firefighting works iv) PHE works. As per Professional Advisor's recommendation, it was prepared in two parts; Part A- which had similar items as per original BOQ and Part B- which consisted of extra items derived through rate analysis, SOR, market rates etc. This ensured that a more practical rate could be obtained.

D. Issue 4: Billing and Escalation

The study of billing and escalation included method, study of contractual clauses, RA attachments, RA format and examples, summary, price escalation, study of R&B/ CPWD method of estimations and related clauses. RA bills were submitted monthly and in total 22 RA bills were prepared for phase 1A. It was reviewed by Professional Advisor (random checking) as well as PMC which ensured precision, lesser mistakes and reduced work from being overlooked. PMC was involved with on-site monitoring but Professional Advisor was involved with day-to-day coordination which was an added benefit. The breakup was 1) Preliminaries-2% 2) Profit-10% 3) Overhead-10% 4) Electricity and water charges-3% 5) VAT-5% The various billing attachments material reconciliation statement, approved drawings as claimed in RA bills, hard copies for BBS, check lists, supporting drawings, test certificates, cement consumption statement- theoretical & practical, measurement sheets, all invoices, pour card details etc. Having the clause of payment as per execution on prorata basis against each item as per price bid and no additional amount payment proved to be very much beneficial. This resulted in many savings as the actual execution cost was ₹206 Cr. for the proposed value of ₹233 Cr. This could be inculcated in future projects for efficient project execution. Price escalation submitted by

contractor claimed ₹950.61 lakhs. But using the R&B price escalation formula and working out the calculations, Professional Advisor recommended ₹474.64 lakhs which emphasized the significance of having an additional monitoring entity

E. Issue 5: Extension of Works

The study of extension of work included related clause study, BOQ study, RA bills study, review various correspondences, approvals, documents etc. Phase 1B is an extension of phase 1A which was given under the tender clause of entrustment of additional items. The BOQ was initially submitted for ₹160 Cr. which was revised to ₹210 Cr. and finally executed BOQ was ₹174 Cr.

IV. OPINION SURVEY

A. Analysis

Opinions survey and qualitative interview was carried out with the Client, Contractor and Professional Advisor on these issues to validate and to know the level of coordination efforts required to achieve the coordination goals for these issues. The key points according to majority were that a great level of efforts was required in the coordination activity due to changes which resulted from location change which emphasized the project to be envisaged right from the grass root level and finalizing the requirements before inducting it. Reviewing of the issues faced would be beneficial for such future projects. Changes occurring should be controllable. Approval and decision-making authority must be speedy and just

B. Major Learnings and Findings

Through the opinion survey, the five issues which were enlisted were validated. The client opined that BOQ process (methodology, approval process, RA bill etc.) was the most critical coordination activity and required the highest level of coordination efforts while the Professional Advisor opined that design management, BOQ, taking over process and coordination activities such as monitoring project performance, identifying potential issues, extra/excess items etc. required the highest level of coordination effort. The contractor opined that getting approvals, BOQ, taking over process and the execution activities such as project performance etc. required the highest level of coordination effort. Each stakeholder had a role to play such as the client would be primarily concerned with the decision making and overall project performance while the Professional Advisor would act as a liaison between the client and contractor and would be more concerned with the coordination and be responsible for all the management activities. The contractor was responsible for ensuring the project was executed smoothly keeping in mind all the performance parameters. This leads to distinct set of responsibility and tasks assigned to each stake holder which can be seen in the Similarity Variance analysis.

The main goal which required most level of efforts from the perspective of various stake holders was studied which indicated that the client primarily needed to monitor and regulate the project while the Professional Advisor and contractor were mainly consigned with providing leadership

which marked the beginning, the decision-making head and the responsible unit for the activity undertaken.

V. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

Mahatma Mandir is an iconic project. It was a time-bound project to be completed within a year but was completed in a fast-track manner within 11 months. A great level of efforts was required in the coordination activity due to various issues faced. The significant role of project coordination can be understood from this study. It can be concluded that project coordination is of prime importance and a must for such iconic projects

B. Recommendation

QCBS method of selection used was appropriate but the proportion could have been different. Fewer limitations should be placed on the contractor (in terms of quality) so that the end results are more enhanced. Scope of the work should be clearly defined before starting the execution. Basic project requirements should be finalized before venturing ahead. This will avoid a great number of changes which occurred in this project. Even if changes occur, there should be a tender clause which prevents issues from transpiring. Clauses which ensure design and variation control should be thought of so that the change is controlled. In this project, an additional Professional Advisor was provided apart from the consultants. This ensured a more thorough and efficient implementation of the project.

Price escalation must be treated with caution and accordingly must be decided on its incorporation in the tender document. BOQ element was critical which the case in majority of the projects. Hence the coordination activities pertaining to it must be carried out with precision and care. EPC mode is the most suitable for projects where the design is complex and new and the client either lacks knowledge or time for handling the project.

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