Role of Mobilization In A Construction Project

Baadal Singh, Bhavana Arora

Abstract: ***Operational issues are involved in every business, and the construction industry is no exception. Most of the project management issues that impact a project arise from associated uncertainties. The Indian construction industry is a growing industry, driven by major projects across the country. There are a number of problems in the construction industry in India that are attributed to various factors. The proposed work would deal with a niche study of the difficulties and criticalities involved during the project mobilization phase of a construction project. This paper presents the factors influencing the mobilization period for 19 projects and its impact on the project timelines and profit margins this also provides a Primavera schedule & Checklist to be followed for mobilization period of the project. The mobilization phase of the project is the most important phase to build the momentum of the project. The right and time bound start can drive the project in a much more efficient manner wherein not only the future delays can be arrested but also it acts as an image builder for the contractor. The mobilization can impact the project not only in terms of delays but also in terms of the costs involved. While delayed mobilization of some equipment may lead to the delay of progress of activities, early mobilization of the same equipment may lead to additional costs involved in handling and storage. It is thus very essential to plan the mobilization activities in sync with the construction sequence. There are many kinds of risks involved in the construction projects because of the large amount of time and cost involved in them. These include but not are limited to timely deployment of staff, labour, machinery, materials, vendors and subcontractors, obtaining all the necessary licenses, permits and clearances, generation of project schedule and pre-start estimate, setup of all the infrastructure works for the site staff and labour etc..***

Keywords: Impact of Mobilization on Project, Schedule for Mobilization, Checklist for Mobilization.

I. INTRODUCTION

Mobilisation refers to the activities carried out after the client has finalized the main contractor and issued the LOI (Letter of Intent). It is a preparatory stage during which the majority of activities are managed by the contractor. This involves equipping the site with adequate resources in order to make it ready to start works in full swing right from the starting. This would include deploying adequate machinery, staff, materials, documentations, compliances etc.

A timely mobilization is very essential for the project progress since it not only builds the initial momentum of the project but also helps in realistic and correct planning in terms of site logistics, cost estimates and revenues. The tentative period considered for effective site mobilization is around 45 days from LOI for a project of worth 100 Crore & above.

Revised Version Manuscript Received on August 12, 2018.

Baadal Singh, Department of Civil Engineering, Kurukshetra University, HCTM College, Kaithal (Haryana), India. E-mail: baadal.singh@shapoorji.com

Dr. Bhavana Arora, Department of Civil Engineering, Kurukshetra University, HCTM College, Kaithal (Haryana), India. E-mail: arora.bhavana14@gmail.com

The mobilization activities are often interrelated due to their dependencies on some common aspects of the project. For instance, only after the required BG's have been submitted can we expect the mobilization advance to be released which would further aid in deploying the required machinery and initial procurement to start the works.

It is very rightly said "Well started is half won"

It is better to incorporate the critical mobilization activities in the project schedule in order to have a better control of the project. In this way it becomes easier to ascertain the effect each of the mobilization activity can have on the start/finish of a project activity. We generally assume a period of 45 days for the mobilization but it often gets misleading in terms of all the criticalities involved in this mobilization and the efforts required to accomplish the same. Many a times it happens that the mobilization activities are not detailed and broken down due to which some pre-requisites get missed resulting in major impacts in terms of cost/time overrun. We have identified the following kinds of mobilizations that are involved in a typical construction project. All these mobilizations are classified department wise; however, the execution of them has a lot of inter department dependency.

II. OBJECTIVE OF THE STUDY

The main objectives of this study were as follows,

A. Examine the factors Which will influence the mobilization period of the Project
B. Examining the Schedule to be followed during Mobilization period
C. Validating the outcome of the matrix by calculating the delay in various projects.
D. Impact of the various factors on the project timelines and profit margins
E. Checklist to be followed for successful Mobilization of the Project

This paper has an objective to act as a foundation for future studies and its results will become worthwhile information in efforts to improve the mobilization period of the project in the construction industry so as to finish the project on time and within budget.

III. LITERATURE REVIEW

Below are different subsets of mobilization as per the functions:

A. Contractual Related

a) Contract finalization/ Sign Off including BOQ finalization

b) Bank guarantees submission for Mobilization Advance & Performance Guarantee.

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication Pvt. Ltd.

These are basically the activities related to documentation and contractual compliance.

B. Administration/Account Related

a) Registrations and Licences-BOCW act, Labour licence, CAR Policy, WC Policy, ESI registration.

b) Permits- Permit to excavate, permit to Use Ground Water, permit to establish & operate batching plant, permit to operate Diesel Generators.

c) Guest Houses Leasing and establishing the mess with all facilities.

d) Labour Hutment construction including all the facilities.

e) Batching Plant

f) Labour Mobilization for both infrastructure and main works.

These are the most extensive and most critical part of mobilization activities as they relate to all the laws compliance along with necessary clearances and permits in order to start the construction activities. These include applying for registration and licences including BOCW act, labour licence, CAR Policy, WC policy & ESI registration

C. HR Related

a) Staff Mobilization

b) Staff Recruitment

The necessary amount of staff is required right from the very first day in order to drive all the other activities. No matter what the activities are, we require staff personnel in order to take responsibilities of works and drive the activities.

D. PMV Related

a) Machinery Mobilization for excavation including excavator, JCB, Dumpers.

b) Machinery Mobilization for Concrete production and transportation including batching plant, transit mixer, concrete pump.

c) Machinery for vertical movement including tower crane, mobile tower crane, builder hoist or passenger hoist.

d) Other machinery and equipment including hydra, Bar Cutting/bending machines.

e) Other Vehicles including Staff vehicles etc.

The critical machinery required during the first phase of mobilization generally includes excavator, batching plant, steel cutting and bending machines, tractors, hydra, staff vehicles etc. All these machineries may not be critical on every project and shall have their own timelines depending on the schedule of project activities.

E. Formwork Related

a) Finalization of formwork scheme.

b) Procurement of formwork component including transfer available within the company.

Concrete constitute the major component of our construction industry and to give the desired shape to the concrete we require the formwork system at the initial stages itself as the most common starting activities are with concrete only. Now a day as structures are becoming unique and critical, we would be required to plan for the formwork system from the tender stage including selection of right formwork system, consumables including the sheathing material to be used.

F. Commercial Related

a) Pre Start Estimate (Is a detailed working which includes costing of a project finalization-within 45 days of issue of LOI as per HO Norms.

b) Infra development – Finalization of vendors for construction of POTA Cabins for office, Prefab labour hutment, Boundary wall/Barricading, Approach Roads, Temporary Establishments like Cement Gowdown and Mechanical Workshops.

c) Work awards for main works – Excavation, anti-termite treatment, water proofing, dewatering & Shoring.

d) Labour rate finalization for main activities including reinforcement, formwork & concreting.

Commercial activity starts with site team preparing the pre stat estimate based on the tender costing on which the project in charges agrees to complete the work within the given budget.

QA/QC Related

a) Quality Management Plan

b) Design Mix approvals

c) Third party finalization

d) Water/Soil Tests

With the issue of LOI, the work for QA/QC team is to document the quality management plan including the procedure involved in doing a work, specifying the norms for the project including wastage, ratios and also the procedural requirement for complying with ISO norms. This becomes the framework for all departments to commence their works.

G. Purchase/procurement Related

a) Vendor Finalization for Major raw materials including Cement, RMC, Reinforcement, Structural steel as per clients approved make.

b) Finalization of vendor of raw materials including sand, aggregate and bricks.

c) Procurement of Raw Materials

H. Planning Related

a) Schedule Approval

b) Resource planning in coordination with other departments

c) Logistic plans

Site planning team which has a major role in success of a project also plays the does the same during mobilization in coordinating with all other departments including methods and planning, procurement, commercial etc.

I. HSE Related

HSE is the most critical part of the project. Project consist of 3M (material, manpower and machinery). To operate project in a fully productive manner the basic importance is given to safety and health of the manpower used on site. It is responsible for scheduling and conducting regular audits, inspecting safety measures, ensuring the HSE policies have been clearly communicated to employees and are being implemented & also responsible for conducting risk analysis to avoid accidents and conduct post-accident research to identify the cause of accident and take measures to avoid its repetition.

IV. QUALITATIVE ANALYSIS FOR RISK ASSESMENT IMPACT MATRIX

In order to identify those risks that should be managed aggressively apply the previously mentioned rating process of High, Medium and Low on the risk probability and the risk impact on each individual/specific risk event separately instead of rating the complete project. A matrix known as a Risk Priority number (RPN) can be constructed that assigns risk ratings to risks based on combining some probability and impact scales. Risks with high probability and impact are likely to require further analysis, including quantification and aggressive risk management. The risk rating is done using a matrix and risk scales for each risk.

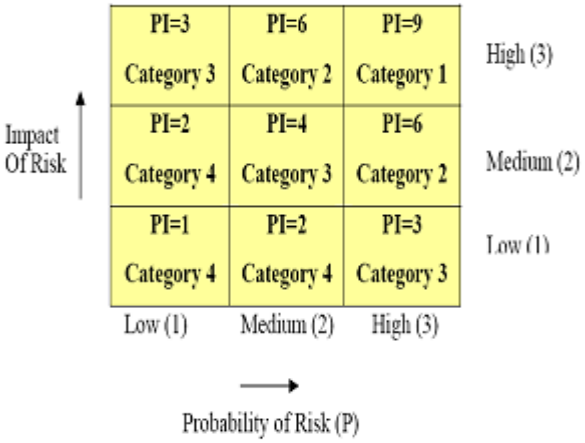
There are various ways of sensitizing the combination of probability/impact factor i.e. the Probability that the risk will occur and its Impact on cost.

We have demonstrated this by assigning a value of 1, 2 and 3 to Probability of Risk occurring and 1, 2 and 3 to the Impact of Risk. This is based on a 3 by 3 matrix.

The higher the risk score, more carefulness is required to manage the risk as a maximum of 9 represents the maximum probability and the maximum impact.

The risk score is calculated as:

Risk Score = Probability of its occurrence X Impact if it occurs



There are 4 categories defined in the above diagram.

Category 1 - PI factor 9, which requires maximum attention

Category 2 - PI Factor 6, which requires a good amount of attention

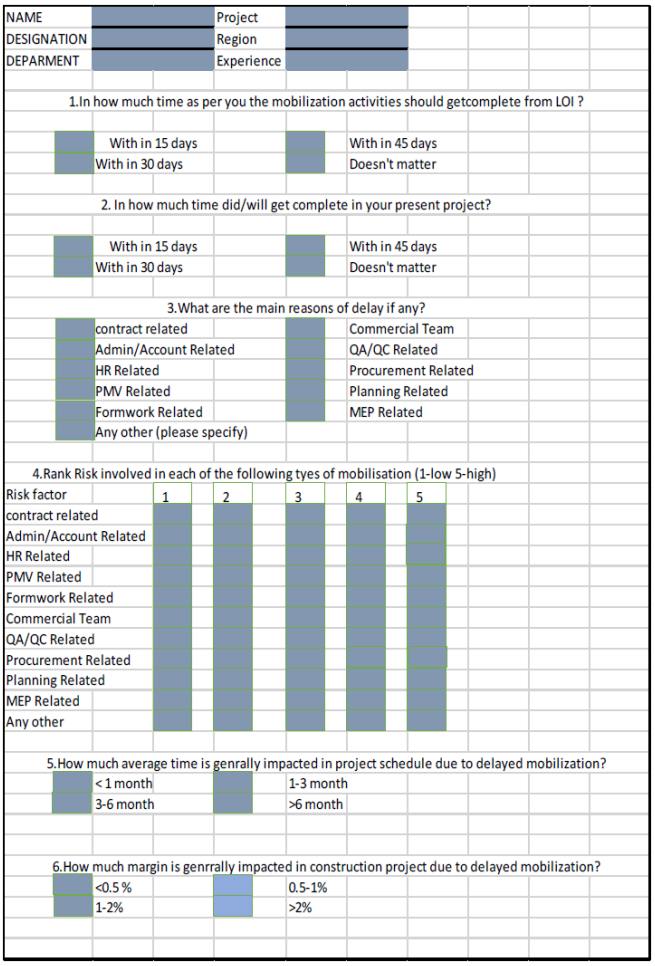
Category 3 - PI Factor 3, which requires comparatively less attention to be paid

Category 4 - PI Factors of 1 and 2, requires less attention to be paid

Based on this study, it would be possible to classify all the different mobilizations under these 4 categories and it will be easier to prioritize the mobilizations in order to prepare an adequate action plan which shall be used to plan the mobilization of a construction project.

V. INDUSTRY QUESTIONNAIRE

A questionnaire was prepared & was circulated to Project-in-Charges and Key Staffs of various projects running in the North Region in order to receive responses regarding critical mobilization activities in a construction project along with the probable extent of their impact



We had sent the questionnaires to almost all the projects of the Delhi region and we have received responses from the following projects:

a) High Level Cancer Hospital, Lucknow
b) 500 Bedded Super Specialty Block, Saifai
c) Amrapali Enclave, Lucknow
d) RBI Staff Quarters, Delhi
e) Ireo's Woods , Panchkula
f) Ireo's Mixed Use Project, Gurgaon
g) Ireo's Branded Residences, Gurgaon
h) DLF Hyde Park, Chandigarh
i) ASF Black Canyon, Gurgaon
j) ASF Housing, Gurgaon

Based on the sample questionnaire attached in the previous chapter, the following is the summary of the responses:

1) The mobilization activities should get complete within 30 days of the date of LOI.

2) In majority of the projects, the mobilization activities completed within 30-45 days with a few projects in which the activities went beyond 45 days.

3) Around 1-3 months of the project duration is impacted due to delayed mobilization.

4) On an average, generally 0.5-1% of the project margin is lost due to delayed mobilization.

5) As per the replies given by site team, following results were found out:

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication Pvt. Ltd.

6) The following are the mobilization activities which got delayed (in decreasing order of precedence) i.e. probability of delay occurrence:

i. PMV Related - High
ii. Formwork Related - High
iii. Procurement Related - High
iv. Admin/Account Related - High
v. Commercial Related - Medium
vi. HR Related - Medium
vii. Contract Related - Medium
viii. QA/QC Related - Low
ix. MEP Related - Low
x. Planning Related - Low

7) The following is the risk content/probable impact of the mobilization delays (in decreasing order of precedence):

i. HR Related - High
ii. PMV Related - High
iii. Formwork Related - High
iv. Procurement Related - High
v. Contract Related - Medium
vi. Admin/Account Related - Medium
vii. Commercial Related - Medium
viii. QA/QC Related - Low
ix. Planning Related - Low
x. MEP Related – Low

Impact of Risk				
	High (3)		HR	PMV Formwork Procurement
	Medium (2)		Contracts Commercial	Admin/Accounts
	Low (1)	QA/QC Planning MEP		
		Low (1)	Low (2)	Low (3)
		Probability of Occurrence →		

VI. CONCLUSION

We carried out combined qualitative analysis of 10 different projects in the Delhi region, case studies of projects in Delhi & Gurgaon Region and found out the following results.

A. Conclusions

In a nutshell we have adopted the following course of actions in order to reach the conclusions of this study:

- Classifying different types of mobilizations.
- Preparing a questionnaire and circulating to projects in order to identify the top 5 critical mobilization activities.
- Interacting with the department heads of those 5 activities and identifying the bottlenecks along with the live examples of projects encountering those delays.
- Case study of 2 projects in 300 Bedded Obs & Gynae Block, Saifai and ASF Black Canyon, Gurgaon in order to compare the planned and actual mobilization dates which further validated those 5 critical activities.
- Comparing 2 projects High Level Cancer Institute, Lucknow and Amrapali Yojana, Lucknow in order to assess the effect of delayed PMV mobilization in terms of cost.
- Visiting the site South Asian University, Delhi in order to assess the actual mobilization hindrances.

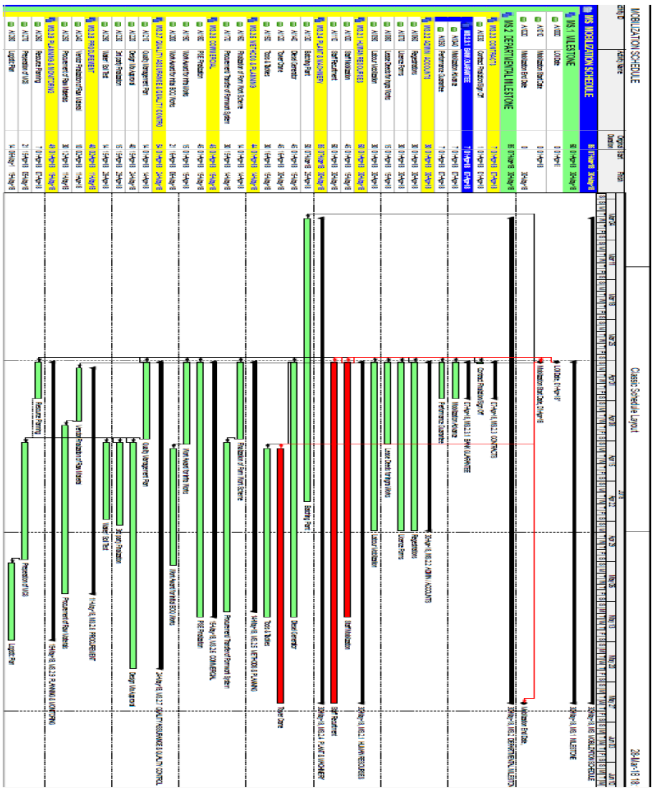
The following are the 5 high risk and high impact based on the above process:

- HR Related
- PMV Related
- Formwork Related
- Procurement Related
- Admin/Account Related

Apart from the above 5 identified critical activities; a mobilization schedule has been prepared considering 85 days of project as mobilization period to streamline the activites for smooth functioning of the project.

VII. SUGGESTIONS

It is prominent that although mobilization is the key driving factor and builds momentum of a project, many a times it experiences delay thereby contributing to overall project time and cost overrun. It is thus very important to realize the importance of timely and efficiently mobilize our construction sites.



In regard to above mentioned conclusions and in order to address them, we have analyzed and brainstormed to arrive at the following suggestive measures:

- Identification of key personnel for the project including project-in-charge, planning-in-charge, billing-in-charge & Admin-in-charge during tendering stage.
- Ensuring the involvement of all RO HODs and project-in-Charge, Planning-in-Charge during the final negotiation stage.

- Identification of key plant & machineries in terms of their required timelines and the existing projects from which these will be demobilized. Health Certificates of these equipment to be attached while transferring to new site along with cost of repair and maintenance till date.
- Alignment of equipment as per project requirements i.e. deploying more efficient/new machinery on large scale projects.
- Identification of other staffs and deploying them as per staff mobilization schedule.
- Conducting Kick off meeting of all stakeholders within 2 days of LOI.

Keeping in view the above mentioned suggestive measures we aim and expect to enforce a speedy mobilization process across all the construction sites, thereby mitigating all cost and time overrun encountered in a project due to delayed mobilization. This shall not only improve the health of our projects but shall also provide the appropriate momentum to the project team during the project start

ACKNOWLEDGEMENT

This study owes its completion to the guidance and contributions of many without whose help it would not have been possible for us to move ahead. We would extend our gratitude to Ms. Bhavana Arora for giving us her counsel and the facilities required for us to proceed with this thesis work.

REFERENCES

1. Kashiwa M Bulaya, Party construction, organisation, administration, and mobilisation
2. Agapiou, A., Clausen, L.E., Flanagan, R., Norman, G., Notman, D.,The role of logistics in the materials flow control process (1998) Construction Management and Economics, 16 (2), pp. 131-137.
3. Jha, K.N., Iyer, K.C. Critical determinants of project coordination, (2006) International Journal of Project Management, 24 (4), pp. 314-322
4. Bell, L. C. & Stukhart, G. (1986). Attributes of Materials Management Systems. Journal of Construction Engineering and Management, 112(2), 14-21
5. Kini, D. U. (1999). Materials Management: The Key to Successful Project Management. Journal of Management in Engineering, 1999, 30-34.
6. Zhang, G. and Ruwanpura, J.Y. (2008). "An Efficient Construction Materials Management Model to Improve Site Labor Productivity" Proceedings of CIB Joint International Symposium 2008, Nov, Dubai, UAE

Baadal Singh, Department of Civil Engineering, Kurukshetra University, HCTM College, Kaithal (Haryana), India. Mobile: 9318488796, E-mail: baadal.singh@shapoorji.com

Dr. Bhavana Arora, Department of Civil Engineering, Kurukshetra University, HCTM College, Kaithal (Haryana), India. E-mail: arora.bhavana14@gmail.com