

Role of Communication in the Large-scale Construction Projects in India

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Abstract

The large scale construction projects require efficient interaction and coordination of multiple stakeholders during the entire life cycle of the project and hence the role of effective communication management is crucial in enhancing project performance. Unfortunately, it is often neglected in India. The objective of the paper is to identify different communication stages in context of the phases of construction project implementation and also, to identify the degree of importance of various communication stages in large scale construction projects and the effects of communication problems arising thereof. It thus attempts to show how effective communication plays a key role in the overall functions of a construction project. Questionnaire survey and semi-structured interviews of professionals working at managerial levels in different large-scale construction projects in India along with a detail analysis of the literature available on the role of communication in construction projects were carried out for this study. The results include identification of various communication stages, their degree of importance and the effects of communication problems in large scale construction projects in India during these phases. This study would be useful for the construction business professionals in determining the critical communication stages in construction project implementation which need more attention.

Keywords- Communication, Project Phases, Construction Projects, India

Introduction

Construction is the second largest industrial activity in the Indian economy and success of the large scale construction projects is a vital factor for its growth. It employs over 32 million people, or 16% of the working population (Chiang *et al* 2005), increasing at over 1 million per year (Majie and Punia 2004) and contributes 5.7% of the GDP (Chiang *et al* 2005). Construction industry covers a wide range of projects and every construction project is unique in nature as it involves myriads of interrelated activities, tasks and work packages (Chris, 2009). With these complexities, construction is observed as the most adverse business among many industries. It requires the interaction and coordination of various stakeholders during all stages of the project life. In present scenario of large scale construction projects in India, the project team members are often geographically separated. Numerous project participants are involved at every stage of the project life and further, these participants are almost certain to vary from project to project. In such situation, efficient communication management is highly required as it can definitely enhance the project performance. But unfortunately, the efficiency in communication management is often neglected in Indian construction business. Even modern, professionally managed construction companies in India face the problem of lack of efficiency in communication management. Hence, there is a need to clearly define the crucial communication stakeholders, the stages of communication in construction project implementation and also the relative importance of these stages, to improve the overall efficiency of the construction organisations.

Construction projects in India at present are far more complicated than ever before. They involve large capital investments, embrace multi-disciplines, engage widely dispersed project participants, operate on tighter schedules and require stringent quality standards (Alashawi & Ingirie 2002). All these factors increase the need of efficient communication. The objective is to identify different communication stages in context of the phases of the construction project

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implementation and also to identify the degree of importance of various communication stages and the effects of the communication problems arising thereof. The paper thus tries to present how communication plays a key role in the overall functions of a construction project. Identification of the degree of importance of communication in different phases of a construction project would help the construction practitioners in understanding the critical communication areas in project execution which need attention. To achieve these objectives, semi- structured interviews and a questionnaire survey of the management professionals working in the large scale construction projects in India along with a comprehensive literature review of the available research on the topic was carried out.

Literature Review

In recent years, it has been identified that some of the fundamental components contributing to the construction industry's poor performance are its ineffective communication practices, its organizational fragmentation and lack of integration between design and production processes (Dainty et al., 2006). Often problems in construction are referred to as communication problems (Emmerson 1962), (Higgin and Jessop 1965), (Latham 1994), (DETR 1998). Due to its specific characteristics, the industry forms a complex communication environment. Construction is a fragmented and dynamic sector with a project based nature. This makes that many stakeholders operate in frequently changing sets of relationships which are contractually driven. The culture shows a reality of conflicts and lack of mutual respect and trust (Dainty et al 2006).

Construction projects are always multidisciplinary, often large, and require the participation of many parties during the course of their execution. These features introduce uncertainty into the typical project. Studies showed that uncertainty increases with the size of the project, and with the number of participants. The size of large projects and the desire to shorten the

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duration of the delivery process require simultaneous procurement of the project. During certain stages, some phases may very often be undertaken simultaneously, requiring major efforts in terms of the coordination and communication between the participants (Shohet & Frydman 2003). Thus, uncertainty is a dominant factor in the planning and construction phases (Laufer 1991; Laufer and Howell 1993; Cohenca et al.1994; Cohenca-Zall 1997). Olson (1982) focused on the effects of poor communications at the management level and productivity at the crew level in construction projects. Jergeas and Hartman (1994) highly recommended keeping good records and communications as a means of avoiding claims and disputes in construction projects. Coble and Snow (1996) as well as Mackenzie et al. (1999) found that communications have a significant effect on the safety records of projects, both in the design and construction phases. All of the above-mentioned studies reflect the key role of communications in ensuring the effectiveness of construction projects.

Role of Communication in Project Execution

The Egan report stresses the need for project managers to integrate projects' phases (from conception to final delivery) leading to performance improvement (Alshawi and Ingirige 2002). Intense integration of alliance partners requires excellence in communication at all levels, i.e. at Application level, System Level and Business level or industry level (Walker et al. 2002, Alshawi and Ingirige 2002, Fischer and Froese 1996). Individual information processing systems or management routines developed by individual functional managers or construction managers also need to be integrated for a given project. A Project Manager managing multiple projects typically shares resources with team members working on many projects over a shorter time. In such situations, key management issues could be resolved by good communication management (Haugan 2002). Also, it is essential not only to support the communication processes within the project, but to consider the multi-project work and the individual needs of the players as well (Katranuschkov et al. 2001).

Role of Effective Communication in Project Success

Numerous studies have highlighted the importance of effective communications for project success (Biggs 1997 and Tam 1999). It was concluded in a study that the top 30 potential problems contributing to poor project performance could be classified under five categories, out of which communication problems are listed as the third category and all five categories involve communications to some extent (Thomas et al. 1998). For example, time delays and increased cost in construction projects can be traced back to poor coordination caused by inadequate, insufficient, inappropriate, inaccurate, inconsistent, late information or a combination of them all (Tam 1999). Communication has also been linked to team effectiveness, the integration of work units across organizational levels, characteristics of effective supervision, job satisfaction, and overall organizational effectiveness (Green 2001).

In present scenario, extensive physical distance between project participants, sometimes extending over national boundaries is the main cause leading to delays in decision-making (Deng et al. 2001). Under such project environment, wide communication problems, ranging from delays to distortion of messages, impose strains on project management in construction (Alshawi and Ingirige 2002). This occurs despite the remarkable advancements in information collection, handling, storage and exchange techniques (Tam 1999). Empirical evidence suggests that there is a potential to make significant improvements in construction supply chain performance (O'Brien and Fischer 1993). Alshawi and Ingirige (2002) identified that communication often takes about 75% to 90% of a project manager's time in the construction industry. Distinctive feature of a supply chain in construction projects is that it is a combination of heterogeneous chains incorporating flow of various categories such as the flow of information and documents to assist in decision-making, and the flow of resources to maintain progress of development (Ahuja and Yang 2005).

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The construction industry is an information intensive environment from design offices to project construction sites. Because of the intensity and diversity of construction information, the efficiency of information management is crucial to the construction industry and has been recognised as an important competitive advantage to construction companies. The efficiency and effectiveness of the construction process strongly depend on the quality of communication. In literature, four reasons are mentioned why improvements in communication are needed. The first reason is that an improvement in the communication within the building team (Higgin and Jessop, 1965), in project teams (Thomas *et al*, 1998) and between project manager and contractors (Franks 1998), (Somogyi 1999) could reduce failure. Second, more open communication at all levels could lead to innovations (Lenard and Eckersley 1997) and better technical solutions (Sörensen, in Atkin *et al* 2003). Third, communication improvements in early phases of projects would positively influence the quality as perceived by all stakeholders involved (Emmit and Gorse 2003), (Brown 2001), (Usmani and Winch 1993). Finally, improved communication during the briefing might lead to better decision making, for example less haste in moving to solutions and better ways of looking at the requirements first (Nutt 1988), (Barrett 1995), (Salisbury 1998).

Time and cost over-runs in large scale construction projects in India, often discouraged owners from undertaking such projects. Control of mega-projects must be catered-for in the planning stage itself. The parameters to be measured or assessed, the method and frequency of reporting, and the levels at which corrective decisions are to be taken, should all be planned in advance (Natarajan, 2003). The construction industry everywhere faces problems and challenges. However, in developing countries like India, these difficulties and challenges are present alongside a general situation of socio-economic stress, chronic resource shortages, institutional weaknesses and a general inability to deal with the key issues. There is also evidence that the problems have become greater in extent and severity in recent years (Laskar

& Murthy 2004). Communication difficulties or disorders during the projects process can directly lead to a sharp increase in the volume of unnecessary expenditure, and also affect the progress and quality of the project (Anumba et al., 1997, Anumba and Evbuowan, 1999; Higgin and Jessop, 2001). Therefore, communication is essential to the success of large-scale construction projects.

It is clear from the above discussion that various research works in this area endorse the crucial role of communication in successful implementation of construction projects. But there is no clarity in research works about the major communication stakeholders in construction projects, stages of communication and which communication stages are more important in project implementation so that more attention could be given to them. The purpose of the present paper is to reduce this gap and explore the said areas.

Research Methodology:

The objective of the present paper is to identify different communication stages in context of the phases of construction project implementation and also, to identify the degree of importance of various communication stages in large scale construction projects and the effects of communication problems arising thereof. It thus attempts to show how effective communication plays a key role in the entire project life cycle in context of the large scale construction projects in India. To achieve these objectives, semi-structured interviews and a questionnaire survey on the basis of a five point Likert Scale were conducted for 52 professionals working at managerial levels in different large-scale construction projects in India. These professionals were asked to identify important communication stages or major communication stakeholders and the effects of communication problems during various phases of a construction project implementation, based on their importance. These were open questions and a descriptive answer was expected to correctly understand the scenario. From

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the analysis of their answers, four crucial communication stages during project life cycle of the large scale construction projects in India were derived. After that, the aim was to determine the relative importance of these four communication stages so that the construction professionals could specifically focus on those stages. For this, a questionnaire survey was conducted in which the level of importance of communication in different communication stages of the construction projects was surveyed. The participants were asked to rank the stages of communication which evolved through their interviews on the basis of a five point Likert scale (5- Extremely important, 4- Very important, 3- Moderately important, 2- Slightly important and 1-Low importance). The data was then statistically analysed to arrive at the conclusions.

The interviewees were selected based on the type of projects they were working in and the domain they were working in. Here in this case, all these fifty two professionals were working at managerial levels in different construction projects in India. It was ensured that these professionals had the experience of working in different phases of a construction project i.e., planning, execution and closure processes. The data were collected in semi-structured, in-depth interviews. The format was that of a conversation with a structure and a purpose. To further ensure the richness of the method, the interviewees were first informed about the aim of the study and how the results would be disseminated. Then they were asked to think of one or more specific projects that they were currently working on or had recently completed. Open interview questions based on the purpose of the study allowed interviewees to talk about their experience. Remarks of all kinds were put into different categories, i.e., the role of communication in overall project functions, major communication stages during project implementation and the effects of the communication problems arising during these stages. The interview method chosen caused that not all of the interviewees' remarks were comparable. For example, some interviewees focused on the organization of the construction

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industry as a whole, while others went into detail about contractual aspects. Despite these differences (mainly in scale), there were lots of parallels drawing a clear picture of the communication environment as formed by the construction industry in India. The communication stages were studied in context of the different phases of a construction project, discussing the effects of the communication problems on the overall project functions. The effects of communication problems during these stages on the overall project performance were discussed with the participants. They were asked to point out the most crucial effects of communication problems which affect the project performance in their opinion. The major points emerging from their remarks were listed down on the basis of the severity of the effects during various project phases as per their opinion. This list of effects is presented in the summarized format at the end of the paper.

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Communication is said to be effective within the working group in the industry only when the transmitted ideas achieve their desired action or reaction. As the operations involved in the construction industry are a team effort, embracing varying participants, i.e. client, quantity surveyor, architect, consultants, specialists, contractor's organization etc., the main objective of communication here is getting things done through multiple stakeholders.

a. Unique Features of a Construction Project

Each one of the construction projects is 'unique' and 'temporary' in nature, and so is the management involved. Here, the term 'unique' means that every project is different in some way from other projects, and the term 'temporary' means that every project has a definite beginning and an end (PMBOK 2000). Some unique features of the construction projects in India as pointed out by P.K. Joy (1990) are:

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- One-time activity – it must be performed correctly the first time every time
- Complexity- it is multidisciplinary because it involves a set of interrelated tasks to be done by specialists
- High cost and time for execution
- High risk of failure
- Difficulty in defining quality standards
- Uniqueness of people relationship
- Feedback mechanism
- Lack of experience of client or owner
- Untrained workforce

These special features are the reason why communication is more critical in construction projects than others.

b. Different Stakeholders in Construction Projects

There are different stakeholders in a construction project who have to work in an information environment where communication between different stakeholders takes place. Fig. 1 given below illustrates these factors.

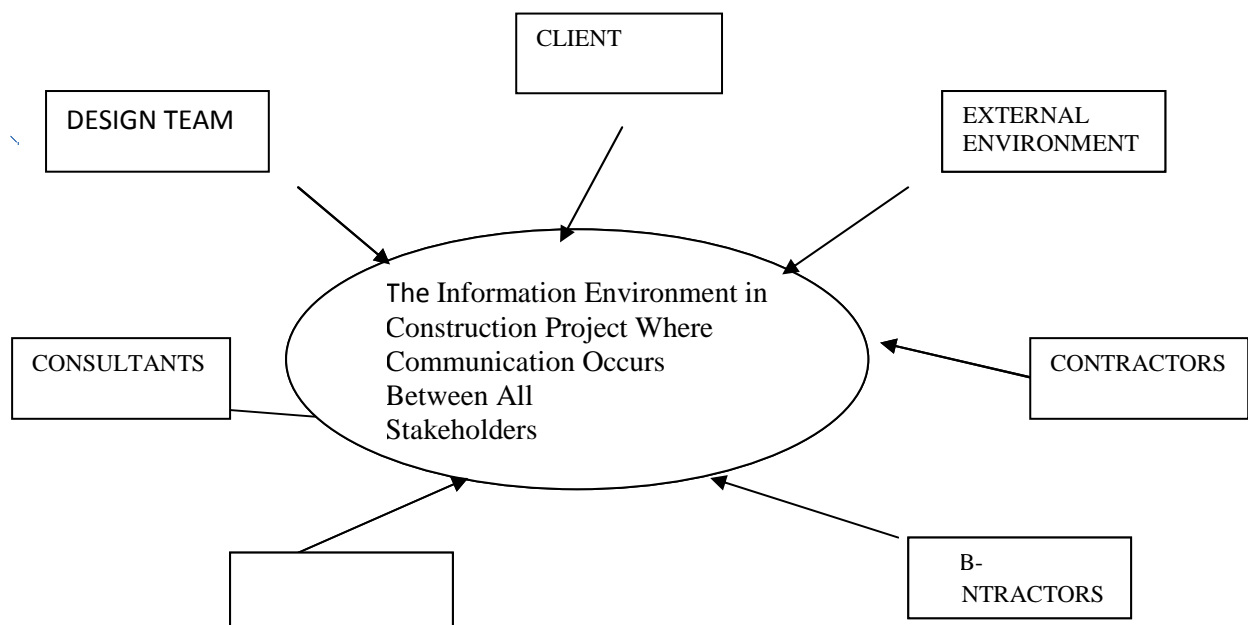


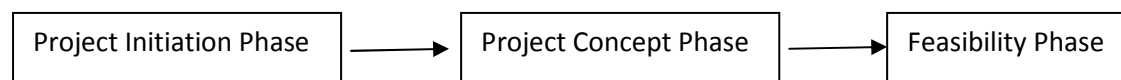
Fig. 1 Different Stakeholders of a Construction Project

c. Need of Efficient Communication Management Across Various Phases of a Construction Project

A construction project is distinctly characterized by a number of phases or stages during its life cycle, though there may be overlaps between the characteristics of two phases. Construction projects could be discussed under three broad categories - a. Pre-project phase b. Project phase and c. Post-project phase. For the study of communication management challenges in a construction project and its effect on the project performance, questions were asked to different managerial professionals currently working or having an experience of working in different stages of the project life-cycle, in context of the management of different phases of a construction project and the communication challenges arising thereof. The nature of each phase of the project, the role of communication in that phase and the important communication stages during these phases, as evolved from the discussion with the interviewees are given below:

Pre-Project Phase

The pre-project phase aims to examine the needs and the possible options related to the project. There are three general phases under the pre-project phase as described below:



The initiation phase aims to sort out all the mentioned information to identify some project concepts. The project concept phase of a new project is most important, since decisions taken in this phase tend to have a significant impact on the final cost. It is also a phase at which

greatest degree of uncertainty about the future is encountered. The selected project concepts, then, are used as the inputs for the feasibility phase.

The interviewees pointed out that communication in the pre-project phase plays a crucial role in further development of a project. If information is not properly processed by the client or not understood by the consultants, there could be many loopholes in planning of the construction projects and if planning fails, it affects execution and control mechanism. The major stakeholders of the construction project communication system at this stage as per the interviewees are:

1. Communication between the Client and the Consultants

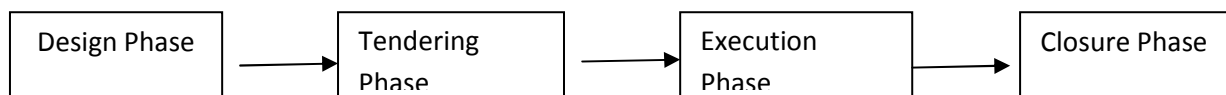
Communication between the client and the consultants is a continuous process from the inception of the project till the final completion. The client is the initiator and financier of the project and the project must be executed to suit his needs and requirements. The first communication in this stage is the client's statement of requirements. It includes information about the size, nature, availability of funds, functions and time limitations of the project. The client's communication should be accurate in this case as many stakeholders participate in development of his requirement functions. The architect or quantity surveyor after carrying out feasibility studies with other consultants who have been appointed to establish that the project is feasible, functionally, technically and financially, prepares a general outline of client requirements and communicates it to the rest of the members of the design team for collective action. The development of the client's brief is a collective effort of all the consultants who in the course of granting approval for such work communicate any alterations and modifications they want effected in the project to the consultants. This procedure continues until the design of the project is completed and the consultants jointly present their design report to the client to confirm that it is a clear translation of his brief. The

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design report must be detailed to include all relevant information required and presented in a manner to be understood by the client (Ayeni, 1986). The interviewees of this study found that in Indian context, this is a crucial problem. Most of the times, there is a communication gap in understanding the client's needs by the consultants and on the other hand, in understanding the planning and technical details reported by the consultants to the clients.

Project Phase

The project phase is also referred as project implementation phase or project realization phase. All major activities related to a project take place during this phase. It has following sub-phases:



During design, tendering, execution and closure phase, multiple teams coordinate with each other and function together to achieve a common goal of project implementation. Communication challenges in these phases are of various natures. The crucial communication stages in this phase as per the opinion of the interviews are:

2. Communication Between the Consultants

This involves effective exchange of ideas and information among the professionals within the design team to advise the client on smooth running of the project. During this phase, the documentation for tendering and contracting the physical construction or for procuring equipment is prepared. There is also a need for architectural, structural and service drawings to be required by the quantity surveyors. The specifications must be clear, definite and concise so that when read with the drawings, they set out the quality of materials and the workmanship or standard required in the project to enable the quantity surveyor to prepare his bill of quantities. During the progress of the work, all of architect or engineers' instructions

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intending to alter the original scheme of work are sent up to the quantity surveyor and must be detailed enough to enable him establish the cost implication of the project and give professional advice. The changes in the designs also need an approval of the client and the important stakeholders of the project.

Most of the interviewees pointed out that, a proper flow of communication from the client to design team, from design team to client and then after evaluation, from consultants to contractors should be followed. If any step of this flow is ignored, it generates a series of conflicts and misunderstandings. Regular design and specification review meeting is one of the important features of this stage of the project. Arranging the documents of the construction contract, negotiating with the qualified design professionals, providing the qualified design professionals with the needed information, updating and reviewing design documents, negotiating contract price with qualified contractor, interpreting and clarifying ambiguities in the contract documents etc. are important communication activities in this stage.

3. Communication Between the Consultants and the Contractor

All emphasis in this stage has been laid on consultants' planning, carrying out studies into areas that might affect the success of the proposed project and exchanging information between the planning team and client. In this stage, the communication network is extended to a very important member of the construction industry, the contractor, who translates all efforts of the consultants into reality which should correspond with the client's requirement. The idea of tender for a project is first communicated to contractors through public advertisements or invitation letters depending on the tender procedures adopted. The quantity surveyor examines the bill of quantities and communicates his findings and recommended actions to the client through a tender report for the purpose of selecting the most suitable

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contractor. The same procedure is used to select specialist sub-contractors. Consultants regularly communicate and follow up with the contractors to ensure that the contract provisions are applied. There is also an interim evaluation wherein exchange of information between the contractor, quantity surveyor and the design team happens.

The interviews were of the opinion that the communication between the consultants and the contractor is a crucial stage. They pointed out that the consultants have to provide clear information to contractor without any ambiguity which facilitates the smooth functioning of the construction project. In large-scale construction projects in India, different consultants work together. Their location might be scattered. At times some of the members of design team are of foreign countries and in such cases communications between them and the Indian contractor firm plays an important role in proper execution of the project. If this is not done properly, project execution doesn't happen as planned. The effects of communication problems in this stage as per the interviewees were wrong constructions, delays, cost overruns etc. which might occur due to improper communication between the consultants and the contractors.

4. Communication On Site

The construction site is a place where the entire efforts made by the design team in visualizing the client's requirements will be put into practice and hence communication on site involves all parties responsible for the project. The interviewees selected for this study were of the opinion that it is the most important communication stage of all stages. They pointed out different processes where role of efficiency in communication is very important at this stage. As per them, apart from the formal communication between the contractor and the consultants in form of drawing, specifications, schedules and the bill of quantities which shows the extent of the work to be done, the contractor is also in close contact with the

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consultants during site meetings. Generally, site meetings are the regular meetings held on the construction site to discuss the progress of the project till date and the difficulties and delays which arise during various stages of the project. This gives the contractor and his principal sub-contractors a good opportunity to sort out their issues with the design team. The site meetings are expected to establish a good link between all the parties involved.

The biggest communication challenge in on site communication as per the interviewees is the information about variations in designs and other specifications. If these changes are not communicated formally and in written form, it can spoil the project construction activities and disputes might arise out of this. Another important form of on site communication is weekly reports and monthly reports. They are a valuable document for the consultants as these keep them informed about the daily activities on site. It also serves as a reference when dispute arises at a later date.

Communication within the contractor's organization includes communication between work area, control points and storage areas. Communication between the store team and the execution team is most common. It is a link between manpower and materials. This aspect of communication is really very important as the work force is an essential part of the industry. This is because unless labour receives regular flow of materials and also is informed of what to do with them, work will definitely not happen no matter how good the management is. Another important communication in this stage happens between control points and work area where managers and supervisors are in close contact with the work men via verbal or written information. The project manager prepares communication plan at the beginning of the project and coordinates with various participants to successfully implement the project.

The interviewees said that the communication with labourers is again a very crucial thing on construction sites. Especially, in a country like India, where labourers from different states,

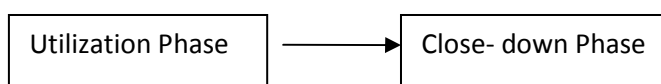
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different communities, and speaking different regional languages come together, communicating with them becomes a critical issue. The construction managers, site supervisors and the project managers should essentially be able to communicate efficiently with them understanding their problems for the smooth functioning of the site operations.

Almost all interviewees were of the opinion that on-site communication failures generate a series of problems in project execution. Various problems occur in information management which includes the lack of maintenance of site records defects in many constructed works etc. Poor co-ordination and communication of design information lead to design problems that cause design error.

Post Project Phase

The post project phase is also known as the turnover phase or the start up phase. During this phase, the responsibility of the materialized deliverable is transferred from the engineers, the architects and/or the general contractors to the owners. The two general phases under post-project phase are:



During utilization phase, the client or the end users make use of the finished project. The performance of the constructed facility is monitored at regular intervals and taking feedback from the end users, maintenance at regular intervals is performed and then the project is finally handed over. Some of the interviewees pointed out that communication with the client at the final stages of the project is a major part of the communication challenges in this stage. But in all, the interviews did not point out at any specific critical communication stage during this phase.

Results/ Findings

On the basis of the semi-structured interviews with the professionals working at managerial levels in different large scale construction projects in India, four major stages of the communication system in construction projects were identified which were found to be crucial in the overall project life cycle. They are: 1) Communication between the client and the consultants 2) Communication between the consultants 3) Communication between the consultants and the contractor and 4) Communication on site. These stages and the effects of communication problems during these stages are explained in detail in the 'Need of Efficient Communication Management across Various Phases of a Construction Project' section (c) of this paper. Apart from this, a questionnaire survey on the basis of five point Likert scale was also carried out to further analyse the relative importance of all these stages. The participants were asked to rank the communication stages of a construction project on the basis of their importance in project execution and the entire project success. The scale given was 5- Extremely important, 4- Very important, 3- Moderately important, 2- Slightly important and 1-Low importance.

The Anova analysis as conducted to test the hypothesis is-

H0: (Null): $\mu_1 = \mu_2 = \mu_3 = \mu_4$

H1: (Alternate): $\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$

Since p-value (= 1.85608E-22) is less than 0.05, H0 is rejected. This implies that we reject the Null hypothesis at a confidence of more than 99%. It further implies that the group means are not different and there is a need to compare the perceptions of the respondents.

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We assume the mean perceptions of respondents are equal in all the four variables in the Null hypothesis. The alternate hypothesis states that these mean perceptions are not equal. The Anova output is summarized in table 1.

Table 1: Importance of Communication in Various Stages of the Project (Anova Analysis)

| Anova: Single Factor | | | | |
|---|--------------|------------|----------------|-----------------|
| SUMMARY | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> |
| Client & Consultants | 52 | 224 | 4.307692308 | 0.21719457 |
| Between the Consultants | 52 | 186 | 3.576923077 | 0.24886878 |
| Between the Consultants & the Contractor | 52 | 226 | 4.346153846 | 0.23076923 |
| Communication on Site | 52 | 241 | 4.634615385 | 0.23642534 |
| ANOVA | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>DF</i> | <i>MS</i> | <i>F</i> |
| Between Groups | 31.66826923 | 3 | 10.55608974 | 45.2440404 |
| Within Groups | 47.59615385 | 204 | 0.23331448 | |
| Total | 79.26442308 | 207 | | |

Source: Anova analysis in Ms/Excel of the data collected

From the table it is clear that 'Communication on site' is considered by the interviewees as the extremely important communication activity across all phases of the project implementation. Its average is 4.6346, highest amongst all parameters. The interviewees pointed out that communication on construction sites is a crucial and dynamic activity. It

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involves many stakeholders who operate on multiple functions simultaneously. Communicating with the labourers and getting things done in the appropriate way from them, also communicating the safety measures, resolving their conflicts are the most challenging communication activities on sites. There is also a lack of proper documentation and formal communication on sites. Most of the activities are carried out on the basis of verbal instructions which cause multiplication of tasks, redoing the things which are wrongly constructed, lack of knowledge about updated project schedules or design changes etc. on the part of execution team which ultimately affects the project performance. On-site communication failures generate a series of problems in project execution which ultimately result in delays and cost overruns. Various problems occur in information management which includes the lack of maintenance of site records, site coordination issues, accidents due to non communication of safety hazards etc. Defects in many constructed works occur due to lack of proper communication between the consultants and the on site team. Poor co-ordination and communication of design information lead to design problems that cause design error. The interviewees pointed out that coordination, team work and proper chain of communication are very important for the successful implementation of this stage.

The participants have ranked the 'Communication between the Consultants and the Contractors' as the second most important communication activity during project implementation. Its average is 4.3461, the second highest among the four parameters. The interviewees were of the opinion that most of the times there are problems in project execution due to improper communication between the consultants and the contractors. If the consultants are not able to efficiently communicate their plans and the project blueprint to the contractor in the first stage of the project implementation phase, the things go terribly wrong from the beginning itself. At times, even in the later stages, where the actual construction starts and taking feedback from the contractor and the client, the consultants make certain

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changes in the initial plans, many problems occur if proper communication doesn't take place. For example, most of the times the consultants make changes in the designs in later stages of the project due to certain reasons which are not properly communicated to the contractors or there are ambiguities in the designs which are not understood by the contractor's team. At times, the consultants and contractors are located at different places. This situation also generates certain communication problems. The effects of communication problems at this stage are delays in project schedule and also at times cost overruns due to wrong constructions which are most of the times the result of lack of proper communication.

'Communication between the Client and the Consultants' is ranked as the third important communication activity in phases of a construction project. Its average is 4.3076. In this stage understanding the client's requirements and planning accordingly is very important. If proper communication doesn't take place between the client and the consultants, it affects the entire project activities. The consultants have to clearly understand the client's requirements and plan accordingly. Any failure in that leads to conflicts and disturbs the whole cycle of project activities ahead.

'Communication between the Consultants' is ranked as the fourth important communication activity by the participants. Its average is 3.5769. The consultants have to communicate and coordinate among themselves for various activities as during the entire pre-project phase. A lot depends on their timely coordination and mutually resolving their internal conflicts so that the project planning activities are carried out correctly and also communicated properly to execution teams.

On the basis of the survey results we can clearly state that all four communication stages pointed out by the interviewees of this research, are important and we need to focus on them for successful project performance. Finding out the most important communication stage,

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would help the construction business professionals to decide on some appropriate strategies for the management of all projects processes. It would give them a clear idea about critical communication areas during construction project implementation and improve on the communication challenges discussed. Descriptive statistics of the survey data is given in the table 2.

Table 2: Descriptive Statistics of the Survey

| Variables | Mean | Median | Standard Deviation |
|--|-------------|---------------|---------------------------|
| Client & Consultants | 4.307 | 4 | 0.4660 |
| Between the Consultants | 3.576 | 4 | 0.4988 |
| Between the Consultants & the Contractor | 4.346 | 4 | 0.4803 |
| Communication on Site | 4.634 | 5 | 0.4862 |

Source: Descriptive statistics analysis in Ms/Excel

Effects of Communication Problems in Large Scale Construction Projects:

The key effects of communication problems during various communication stages on the overall project performance on the basis of the discussion given in the earlier sections of the paper are summarised below. The interviewees were asked to point out the most crucial effects of communication problems which affect the project performance in their opinion. The major points emerging from their remarks were listed down on the basis of the severity of the effects during various project phases as pointed out by the survey participants.

1. On-site communication failures generate a series of problems in project execution which ultimately result in project delays and cost escalations

Role of Communication in the Construction Projects

2. Various problems occur in information management which includes the lack of maintenance of site records, site coordination issues, accidents due to non communication of safety hazards etc.
3. Defects in many constructed works
4. Poor co-ordination and communication of design information lead to design problems that cause design errors
5. Increased overheads due to delay
6. Effect on Schedule
7. Decrease in quality of work
8. Conflicts between the contractors and the client due to miscommunication

Conclusion

The results of this study clearly reflect that efficiency in communication plays a key role in the successful implementation of large scale construction projects in India and affects the performance of the entire life cycle of construction projects. From the analysis of the interviews and the survey conducted with the professionals working at managerial levels in different large-scale construction projects in India, four major stages of communication in construction projects were derived. They are, 'Communication between the Client and the Consultants', 'Communication between the Consultants', 'Communication between the Consultants and the Contractors' and the 'Communication on Site'. It was revealed from the Likert scale survey analysis that the 'Communication on construction sites' is the most important communication stage amongst all project communication stages. The second important communication stage emerged out to be the 'Communication between the

Consultants and the Contractors' and the rest two stages, i.e. the 'Communication between the Clients and the Contractors' and the 'Communication between the Consultants' are ranked as the third and fourth important communication stages by the survey participants. This analysis gives a clear indication about the critical areas in communication management in construction projects which need more attention. The study would help the construction business professionals to understand the significant role of communication in project performance, the communication stages and the relative importance of different communication stages in context of the various phases of construction project implementation. The study asserts the point that there is a need to develop a proper strategy to improve communication management in various stages of the construction projects as it largely affects the overall project performance.

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