

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH  
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**INVESTIGATION OF CAUSES OF DELAY IN HIGH RISE BUILDING, CASE  
STUDY-PUNE****Dr. P. P. Bhangale\***

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**ABSTRACT**

Delays in a construction project can be regarded as a failure. This paper aims to investigate the causes of delay in high rise building projects in Pune city. The industry which is experiencing frequent and costly delays is the building and construction industry. However, a numbers of construction projects which had the delay problems are very significant. Construction project involves many unpredicted factors which results from many sources. These sources include the performance of contractors, resources availability, weather conditions and contract systems. However it occurs in every construction project and the significant of these delays varies considerably from project to project. Therefore delays are important problem in the construction sector. Research into this sensitive area is essential in order to improved administration delay conditions and to diminish their consequences. This study is to diagnose the relevant factors contributing delays

**KEYWORDS:** Delays in high rise building, Practical reasons of delays for building projects in Pune**I. INTRODUCTION**

The unpredictability of human behavior shows that people are unique and operate on different ideas and backgrounds. In addition, the brain function varies from one human to another human. This creates a diversity of how people think, act and make decisions. The study of human behavior requires a deep and thorough research on people in different places and environments. Human beings are unique in most of their operations. This is the reason why the study of human is complex. Human Behavior refers to the full range of physical and emotional behaviors that humans engage in; biologically, socially, intellectually, etc. and are influenced by culture, attitudes, emotions, values, ethics, authority, rapport, persuasion, coercion and/or genetics. Emotions and mood can affect temperament, personality, disposition, and motivation. They can affect a person's physical well-being, judgement, and perception.

Another parameter is technical failure which is responsible for delays in construction activities of high rise building projects. Technical failure happen either decision taken by authorities on site/office or ambiguity in decisions due to which unnecessary delay occur. This research includes study about investigation of causes of delays in high rise building project which is located in Pune city. Site consists of six high rise buildings including podium, commercial complex, gas supply unit, club house, etc. Fully furnished and equipped project delayed due to practical reasons which came across development of project.

**II. LITERATURE SURVEY**

**Samir Kumar Bandyopadhyay and Goutam Roy Chowdhury** *Philosophy and Emotion of human being: a proposed method*, *International Journal of Current Research*, Vol. 8, Issue, 11, pp.42526-42533, November 2016-Human-like robots and machines that are expected to enjoy truly intelligent and transparent communications with human can be created using automatic facial expression recognition with a set of specific desired accuracy and performance requirements. Facial expression recognition deals with the problem of classifying facial images into expression classes. It has been of interest to a growing number of researchers and much progress has been made during the last two decades. Expression recognition involves a variety of subjects such as perceptual recognition, machine learning, affective computing etc.[1]

**Phaniraj K, K S Sreekumar**, *Practical Factors Affecting Delay in High Rise Construction– A Case Study in a Construction organizations* *International Journal of Engineering Research & Technology* ISSN: 2278-

**0181 ,Vol. 3 Issue 5, May 2014-** A construction project is successful only if the target(s) is/are achieved as per schedule and following the baseline to the core. Any variations from these can be called a delay. Thus, delay in construction project is a situation in which the project cannot be completed within a planned time. Any delay is an expense to all the parties involved in the completion of a particular project. As a result, these may often end up in clashes between parties, arbitration or litigation and in certain cases can lead to the total abandonment of project. This is a common issue faced all over the world.[2]

**Dinesh Kumar R ,Causes and Effects of Delays in Indian Construction Projects International Research Journal of Engineering and TechnologyPg-ISSN: 2395-0072 Volume: 03 Issue: 04 | Apr-2016-** Construction industry is the second largest and basic input for socio-economic development of our country after agriculture, which has contributed an estimated amount of Rs.9,28,418 crore to the national GDP in 2014-15, a share of around 8.04%. Though construction projects in India facing various problems, delay in construction is one of the major issues. It is defined as “the time overrun, either beyond the completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project”. It is considered as a common problem in construction projects. In most of the projects, there will be delays and their impact level varies on each project which depends on several factors such as nature and the type of construction, importance of the project, etc. When the project gets delayed, either the delivery time of the project will be extended or the progress of the project will be accelerated heavily in order to deliver it on time. The former will lead to arbitration, litigation, and penalties, etc. and the later will lead to incur additional cost, both will end up with loss of money. In worst case, accelerating the process of the project will also affect the quality of the output which sacrifices client’s satisfaction.[3]

**NaikwadiSumaiyyaR,KharePranay R, Causes of Delays in any Construction Project, , International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 ,Year 2013-** Construction industry are one of growing industry in all over world. In construction projects time and cost overruns are identified as one of most important factors responsible for abandonment. Delays and disruptions are challenges faced by construction industry. In present scenario of construction world, though we have lot of methods for timely completion of projects, still delay is inevitable, which ultimately affect the efficiency of project. Perhaps lot of studies carried out for delay findings and minimizing ill effects of delays in projects. Still there are lot of projects which run behind schedule and suffers heavy loss Construction is ever changing challenging and dynamic industry. The research is aimed to indentify major causes of delay.[4]

**Anita Rauzana,Analysis of Causes of Delay and Time Performance in Construction Projects,IOSR Journal of Mechanical and Civil Engineering, p-ISSN: 2320-334X, Volume 13, Issue 5 Ver. III (Sep. - Oct. 2016), PP 116-121-**a delay in project implementation can be classified into three things: a compensable delay, non-compensable delay, and concurrent delay. The success of a construction project depends on the cooperation between the parties involved, namely the building owners,contractors and project planners. Many factors could hinder the implementation of construction projects. The success of carrying out construction projects on time without any obstructions in the implementation is one of the most important goals. Project construction experience obstacles and constraints in implementation is a condition that is very undesirable, because it would be very detrimental to all parties. Every construction project has a specific implementation plan, when the implementation of the project should begin, when to be solved and how it will carried out, and how the provision of resources. The problem will arise if there is no appropriateness between the plans that have been made with the actual reality. Problems that arise would be an obstacle to be avoided for the implementation of construction projects can proceed smoothly. The result showed that the main cause of the factors that affect delays in the completion of projects in Aceh Besar was social and cultural factor.[5]

### III. REASONS FOR PROJECT TIME OVERRUNS OR DELAYS ACROSS PROJECT LIFECYCLE

#### 1. Pre-planning stage

-External Issues

- Delay in regulatory approvals
- Unavailability/delayed availability of funds
- Land/site handover

-Internal Issues

- Lack of project managers/commercial managers with adequate planning skills

- Lack of liaising Officer / Planning Engineer
- Lack of cost managers
- Lack of safety of officers/environmental practitioners

## 2. Planning and Design stage

### - External Issues

- Lack of strong Remove & Replace policies
- Ineffective procurement planning
- Design/scope change
- Delay in regulatory approvals
- Delay in decision making

### -Internal Issues

- Lack of planning engineer/commercial managers
- Lack of liaison officer or planning engineer
- Lack of MEP engineers

## 3. Execution and Monitoring

### - External Issues

- Weak/ineffective project planning & monitoring
- Contractual disputes
- Unavailability/delayed availability of funds
- Lack of strong Rules & Regulation policies
- Delay land/site handover

### -Internal Issues

- Lack of project managers / site managers/planning engineers / quantity supervisors
- Lack of awareness modern equipment &

### technology

- Lack of liaison officer and commercial officers

## 4. Closure and Handover

### -External Issues-

- Promise of 24x7 Water, Electricity, Gas supply troubles
- Contractual disputes

### -Internal Issues

- Lack of possession
- Project and site managers
- Audit and total quality management professionals

## **SKILL REQUIREMENT ACROSS VARIOUS DEPARTMENTS TO CHECK DELAYS**

### **Finance-**

- Project financing
- Indirect taxation
- Working capital
- Treasury management

### **Scheduling-**

- Construction management
- Scope management
- Quantity survey
- PM software

### **Environment Health and Safety (EHS)-**

- Environmental Laws
- Industrial Safety

- Labour Laws
- Equipment management

**Risk-**

- Risk assessment
- Impact assessment
- Risk planning

**Quality-**

- QMS
- ISO standards
- Auditing techniques

**Cost-**

- Estimation
- Quantity Survey
- Cost control
- Billing and Accounting

**Contracts-**

- Contracting
- Contract Laws

**MIS-**

- Communication Planning
- Reporting
- Stakeholder management

**Engineering-**

- Civil/Mechanical Engineering

**Important Delays due to Consultant related factors-**

- a) Delay in assessing/evaluating major changes in the scope of work
- b) Design errors made by designers
- c) Inadequate site investigation
- d) Unclear and inadequate details in drawings
- e) Delay in preparing interim payment certificates
- f) Delay in reviewing and approving design changes
- g) Delay in performing inspection and testing
- h) Complexity of the project
- i) Lack of experience of consultant in construction projects
- j) Conflicts between consultants
- k) Insufficient data collection and survey before design
- l) Poor communication and coordination with other parties
- m) Misunderstanding of owner's requirements
- n) Inadequate project management assistance
- o) Insufficient estimation of original contract duration
- p) Unfavourable contract clauses
- q) Inadequate definition of substantial completion
- r) Poor use of advanced design software

**Important Delays due to Contractor related factors-**

- a) Financial indiscipline/dishonesty
- b) Inadequate contractor experience
- c) Incompetent project team
- d) Inappropriate construction methods
- e) Poor site management and supervision
- f) Poor procurement of construction materials
- g) Absenteeism
- h) Ineffective project planning and scheduling
- i) Late delivery of materials
- j) Rework due to errors
- k) Poor communication and coordination with other parties

- l) Unqualified / inadequate experienced labour
- m) Low motivation and morale of labour
- n) Low productivity of labour
- o) Improper equipment
- p) Obsolete technology
- q) Frequent equipment breakdowns
- r) Unreliable subcontractors
- s) Shortage of equipment
- t) Poor quality of construction materials
- u) Subcontractor turn-over
- v) Shortage of labour
- w) Slow mobilization of labour
- x) Low efficiency of equipment
- y) Slow mobilization of equipment
- z) Damage of materials
- aa) Strike
- bb) Personal conflicts among labour

**Important Delays due to Client related factors-**

- a) Corruption tendencies
- b) Intermittent stoppage of work due to cash flow constraints
- c) Change orders
- d) Delay in payments
- e) Changes in material types and specifications during construction
- f) Delay in approving design documents
- g) Design changes by owner or his agent during construction
- h) Poor communication and coordination with other parties
- i) Slowness in decision making
- j) Conflicts between joint-owners
- k) Inadequate information during project feasibility study
- l) Delay in site delivery
- m) Lack of incentives for contractor to finish ahead of schedule
- n) Lack of capable representative
- o) Lack of experience of owner in construction projects

**Important Delays due to External factors-**

- a) Unfavourable weather conditions
- b) Legal disputes between project participants
- c) Shortage of construction materials
- d) Unexpected surface & subsurface conditions (such as soil, high water table)
- e) Delay in manufacturing materials
- f) Accidents during construction
- g) Environmental and social factors
- h) Geopolitical and regional stability
- i) Escalation of local material prices
- j) Global financial crisis
- k) Price fluctuations on the international market
- l) Unreliable suppliers
- m) Conflict, war, and public enemy
- n) Ineffective delay penalties
- o) Delay in obtaining permits from local authority
- p) Natural disasters (flood, hurricane, earthquake)
- q) Changes in government regulations and laws
- r) Delay in providing services from utilities (such as water, electricity)
- s) Problem with neighbours
- t) Loss of time by traffic control and restriction at project site

Delays and disruptions are among the challenges faced in the course of executing construction projects. Delays as well as disruptions are sources of potential risks that current studies are looking into ways to manage such as technical, social, economic, legal, financial, resource, construction and commercial. In construction, the word “delay” refers to something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project. Rigid project schedule, design variations, excessive approval procedures in administrative government departments, variations by the client, incomplete approval and other documents, unsuitable construction program planning and inadequate program scheduling. Three most significant factors that adversely impact construction project delivery time performance are: quality of management during construction; quality of management during design, and design coordination. Main causes of delay were related to designer, user changes, weather, site conditions, late deliveries, economic conditions.

#### IV. FIELD OBSERVATIONS

- In planning phase management had ambiguity about success of project because site was surrounded by four other owners.
- These owners were not ready to sell their property to developer even at higher prices but only interested to get monthly payment against services given by them such as permission to developer to pass through their land to reach main site.
- Construction of main project road was delayed due to land matters.
- Out of six towers two completed as per schedule.
- Next four buildings alongwith 1,50,000sqft podium were delayed due to adverse site conditions and approvals
- Delays occurred due to frequent changes in design at initiation stage of project.
- Major mistakes were done by designers because without checking each and every part of land they made designs and as per nature of land changes at few distance future difficulties occurred in execution.
- Huge project always have huge number of drawings and sometimes it is noticed that few of them missed and needed to reprint again which consume time.
- Due to human behavior conflicts occurred between consultants
- Drawing approvals by project engineers often used to take more time because sometimes ambiguity resolved after fair discussion with consultant only which causes delay.
- Few delegates of designer were not in proper communication with site officials due to which agitation created on site manytimes.
- Designs were frequently changed as per site conditions which raised headache to all.
- Out of four main contractors one was very casual who often absent at crucial events like critical activities.
- Incompetent team of contractors used to waste material like cement so many times shortage of cement occurred for activities which were under other contractors.
- Few contractors had financial indiscipline/dishonesty towards their employees and workers which generated negative attitude in work cause delay.
- Rework due to errors by unskilled workers and supervisors drastically hampered growth of project.
- Frequent equipment breakdowns made delays in project completion.
- Unbelievable subcontractors e.g. Soling contractor whose billing used to complete on Saturday under blue collar category, always trying to do some fraud by keeping voids in soling so after checking many times it was observed that low quality material used in it which cause delays.
- Many times suppliers of construction material used to bring poor quality on site and due to which quality control and quality assistance department went under many complications like conflicts which raised delays.
- As per information getting from contractors some engineers were interested in malpractices like corruption, unofficial fees.
- Lack of incentives for contractor to finish ahead of schedule.
- Unfavourable weather conditions like heavy rains, acute summer, windblows, etc.
- Accidents during construction by drivers or workers due to which sudden progress of work used to stop even those were critical activities.
- Failure of schedule sometimes due to miscellaneous reasons.



## V. RECOMMENDATIONS

### 1. Consultant Related Discussion-

- Consultants should ensure that all design changes during the execution of the works are handled explicitly while not compromising the desired outcome of the final project.
- Any design errors made by consultants must be immediately rectified to avoid delays in the progress of works.
- The consultants should ensure that adequate site investigations are carried out both during feasibility study and conceptual design so as to ensure that appropriate measures are taken care of during the detailed design so as to avoid suspension of works during the construction phase to address the design challenges.
- All working drawings must be clearly drawn indicating all the dimensions and labels to scale so as to avoid ambiguity during construction.
- The consultant should ensure that there is a competent representative on the site to make quick decisions that are binding and to ensure that works as to facilitate preparation of interim payment certificates that have to be measured prior to covering are done so as to facilitate preparation of interim payment certificates.
- The lead consultant should ensure that there is timely, accurate and adequate communication between all stakeholders during pre-contract, contract and post-contract period.
- The consultants should ensure that adequate due diligence is made prior to recommending a contractor for award of project to ensure that the right contractor with the required capabilities is sieved out of the bidders.

### 2. Contractor Related Discussion-

- Contractors should pay particular attention to the requirements of the assignment during the pre-contract and bidding period so as to go for works that they have competitive advantage.
- Contractors should ensure that they have enough cash flow to execute the works and desist from the practice of diverting particular project funds to non-project activities to avoid being cash-strapped during the execution of the works.
- The contractors should ensure that they have adequate experience for a required assignment, deploy competent project team and employ appropriate construction methods for the required assignment.
- The contractor should ensure proper planning and scheduling of the works and ensure effective site management and supervision of the works so as to keep watch on critical activities and strive to complete projects within the specified time while meeting quality and cost requirements.

### 3. Client Related Discussion-

- Clients must ensure that their demand in design changes during the construction period should have no adverse effects on the critical activities so as to avoid causing delays.
- All change order demands must be evaluated to assess their impact on quality of work envisaged, scope and cost, possible claims and disruption to work so as to avoid unnecessary disputes and litigation.
- Clients should ensure that proper planning and costing of the works are made during the pre-contract period so as to avoid intermittent stoppage of works as a result of funding constraints since this not only increases the construction period but also impacts on the contractors overhead costs and costs associated with mobilization and demobilization during the period within which the works were suspended.
- Clients should ensure that interim payment certificates are paid in time within the stipulated time-frame to avoid having interest penalty.

## VI. CONCLUSION

- Incompetent management is major reason for project failure. Managers are responsible for creating a project plan that includes all the required elements and delivering the completed project by the deadline.
- A construction manager is there to assign roles and responsibilities within a project and to coordinate labor and materials to the job site so work can get done in a timely fashion. A great construction

manager can manipulate several aspects of a detailed project plan while working to minimize delays and aggressively remove blockers which can hold up progress.

- Many contractors start projects of various sizes without a clear timeline, finalized drawings, or prior communication with critical subcontractors. That's a big mistake. Project plan should be exhaustive. It should include every detail required to complete the project, while accounting for variables in the execution process that could create delays.
- Commercial construction projects have many employees, contractors, subcontractors, managers, and other personnel directly involved. Any failure to delineate exactly what each party's responsibilities are in the project can result in critical tasks being ignored and create significant project delays.
- Schedule contractors far in advance by giving all planning and execution ideas.
- Establish clear communication between parties
- When challenges materialize on the job site, it is crucial that contractors have a direct line to the project management team and that stakeholders are easily reachable for consultation. All must quickly diagnose, assess, and communicate the problem to all key stakeholders, and to get everyone together to find a resolution as quickly as possible.

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