CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD


# An Investigation into Causes of Delays in Construction Projects of Pakistan

by

Muhammad Muneeb Hayat

A thesis submitted in partial fulfillment for the
degree of Master of Science in Engineering Management

in the

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Department of Mechanical Engineering

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*This thesis is dedicated to my family.*


# CERTIFICATE OF APPROVAL

## An Investigation into Causes of Delays in Construction Projects of Pakistan

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# *Abstract*

Construction industry is considered as a backbone in a developing country such as Pakistan. A countrys economic status depends upon how well served the country is by different modes of Construction projects. However in the construction projects, Pakistani industry is facing problems of construction delays due to various causes. Delays may be due to poor planning that could be compiled into various categories. All these delays ultimately lead to failure of projects. Under these circumstances; quantitative analysis studies may be required to establish reasons of delays. Present research was focused on investigating which are various categories of delays and their possible reasons. An extensive literature review was conducted to establish possible categories of construction project delays around the world in the first phase of this research. It helped to identify broad delays categories based on issues related to Equipment, Material, Management, Construction Management problems, Clients and Consultants. These delays affected the project timeline and created conflicts between parties as well as effect a time and cost overruns of the project. Most of the times construction engineers were faced with these delays during the implementation of a project. A questionnaire was developed to interview various stakeholders of construction industry in Pakistan to identify delays being faced in this country. A total of 110 respondents with various level of experience in the industry were approached to provide input to the survey. Statistical tools were used to analyze the results of surveys and develop inferences based on collected data. The results showed that broad categories of delays were somewhat the same as observed in literature. However the delays could be improved by better planning, management, site coordination, resolving approvals issues, meeting financial deadlines, taking remedial actions in adverse weather conditions, focusing on critical as well as noncritical project activities, taking care of excusable or non-excusable delays, management for compensable or non-compensable reasons of delays, investigating concurrent or non-concurrent delays and mitigating risks on time and with sufficient resources.

**Keywords: Delated Categories, Delays Reasons, Delays Analysis and Top Ten Delays Effecting in Pakistan Construction Industry.**

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# Chapter 1

# Introduction

## 1.1 General Background

Construction industry is considered among a major revenue earning engineering industry around the world. The successful execution of a construction project is based on a number of factors such as planning, estimating budgets, value engineering, construction processes, methodology of development beside others. Projects always face different issues in execution and completion within scheduled time period. In construction, the delay could be 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.

To the owner, the delay means loss of revenue through a lack of production facilities and rent-able space or a dependence on present facilities. From a contractors perspective; delay means higher overhead costs because of longer work periods, higher material costs through inflation and increases in labor cost. Completing projects on time is an indicator of efficiency and include performance of parties, resource availability, environmental conditions, involvement of other parties and contractual relations. A construction project is commonly admitted successful when it is completed on time, within budget, according to the specifications and stakeholder satisfaction. However, most of the projects finish either before or after

the schedule due to uncertainties of events and its uniqueness. Generally, there are four basic ways to categorize delays:

(i) Critical or non-critical

(ii) Excusable or non-excusable

(iii) Compensable or non-compensable

(iv) Concurrent or non-concurrent

The latest trends in construction and levels of funding allocated to construction projects annually has resulted in unique designs, structures, materials, involvement of computers and holographic imaging , magnitude of resources, environmental considerations and international laws have made this industry a vital area of research in various dimensions. However still the projects see unusual delays due to various reasons faced by large and small construction companies. Therefore a lot of research is going on in establishing causes of delays in construction projects around the World.

## 1.2 Background of Pakistan Construction Industry

The Volume of construction is increasing in Pakistan. Construction Development is also promoting at Government level. The construction industry is experiencing severe delays. The factors of delays are very high in Pakistan Construction industry and Pakistani construction industry are no exception to this situation. But in over past ten years, observed that there has no research compilation on delays problems. The most common factors of delays are: natural disaster in Pakistan like flood and earthquake and also some others like financial and payment Issues, improper planning, poor site management, insufficient experience, shortage of materials & equipment, Approval issues and slow decision making. Author

is also working in construction industry from past 8 Years and experienced that there is no relevant literature available of delays problems in Pakistan. Therefore present thesis was focused on investigating causes of delays in construction projects in Pakistan. Pakistan Construction industry is widely spread in throughout the country. There is different types of construction is ongoing at small and large range; Like Residential, Multi High Rise, Infrastructure development and Industrial construction projects. Public and private sectors both are working on construction industry in Pakistan but the probability of delays is very high in mega projects of public and private sectors.

## 1.3 Problem Statement

There is a limited research on causes of delays in construction project in Pakistan. Therefore a detailed investigation is required to identify what are the major causes of delays in construction projects in Pakistan and to also identify that is it similar to the construction industry around the world or is there any difference. Therefore it is very important to evaluate the particular reasons of delays in Pakistani construction industry.

## 1.4 Objectives of The Study

The objectives of this study include the following

(i) To identify the causes of delays in Pakistan construction industry through collection of data from industry experts including corporate, senior, intermediate and field management levels.

(ii) To collect data from public and private company executives, middle level managers and working professionals through the questionnaire survey regarding causes of delays in Pakistani industry

(iii) Compile the questionnaire and establish findings.

(iv) To carry out statistical analysis of collected data.

(v) To draw inferences from analyzed data and confirm the causes of delays

(vi) To provide recommendations for future study.

## 1.5 Methodology of Research

This research was conducted in the following steps:

- Review of literature.
- Identify categories and any sub categories of delays.
- Collect data from Pakistani industry and professionals.
- Compilation, statistical analysis and inferencing of data.
- Discussion of results based on literature.
- Establish conclusions and future recommendations.

## 1.6 Summary

Present research is expected to provide a review of major causes of delays in construction industry as investigated in the past around the world. Findings and results will be compiled in form of major and sub categories of causes of delays in construction projects. Questionnaire survey conducted in Pakistani industry will compile the lessons learnt by various public and private companies during planning and execution of such projects in Pakistani environment. Experience of professionals will be translated into lessons learnt about such delays in Pakistan for the reference of future researchers. A step by step approach adopted in current study will also be useful for future research.

# Chapter 2

# Literature Review

An extensive review of literature helped to identify causes of delays in construction projects. Based on literature author was able to establish major causes of delays that could be grouped into sub categories with various levels of importance. Details of these categories and relevant literature is discussed below.

## 2.1 Equipment

David Arditi, Shruti Nayak, Atilla Damci, et al. (2016) investigated shortage of equipments delay in terms of equipment breakdowns, improper equipment through comparison between American and Indian Construction Industry. They found that American construction companies experience less delay in their projects than Indian construction companies. As unavailability of Efficient Equipment Contractors related delays, Mohamed M. Marzouk, Tarek I.

El-Rasas (2012) stated the need of monitoring and periodical reporting of critical and long lead items and periodically providing a narrative explanation of delay. Krzysztof Kaczorek (2016) and Hemanta Doloi, Anil Sawhney, K.C. Iyer, Sameer Rentala (2012) investigated Inefficient Use of Equipment as a leading cause of delays. According to their research, in efficient use of equipment results into

untimely mobilization of equipment leading to delays. These factors subsidized the identification of first category of delays for our research.

## 2.2 Material

Materials related delays are very common delay reasons in Construction industry as well as others. Aysha Batool, Faisal Abbas (2017) et al discussed the delay cause, Shortage of Material in their research of Hydro power projects in Pakistan. Hemanta Doloi, Anil Sawhney, K.C. Iyer, Sameer Rentala (2012) and Aysha Batoola, Faisal Abbas in (2017) investigated the delay of improper storage of material leading to damages is common in construction project. According to their research, negligence of contractors and sub-contractor can cause delay in construction project. According to Aysha Batool, Faisal Abbasa in et al (2017) and Hemanta Doloi, Anil Sawhney, K.C. Iyer, Sameer Rentala (2012) delay in Material Procurement by Contractor the Factor/reason can cause about 11.61% of total variance of the linear component (Reasons) and also cause the delay due to material quality. Commitment from all the parties involved is essential for successful completion of any project, element of delay in material delivery by vendors shows the lack of commitment in terms of contractor's procurement planning prior to construction phase of project. Ignorance of the lead time for material delivery by the vendors is leading to result of the material shortage, which has reportedly been one of the significant causes of schedule delay across construction projects. For this research delays due to Material has considered as second category.

## 2.3 Management

Management issues are most common issues in construction industry around worldwide. In Construction projects, project face management issues that cause the delays in projects site and these issues create the problems to fulfill completion of projects. Aysha Batool, Faisal Abbas (2017) investigated the delays due to

Issuance of LOA & Issues of Planning & Scheduling. They focused on three of the 6 recently completed projects by WAPDA i.e. Allai Khwar Hydro Power Project (AKHPP), Duber Khwar Hydro Power Project (DKHPP) and Khan Khwar Hydro Power Project (KKHPP). All three projects suffered delays from 5 to 6 years. According to Saudi construction Industry, Jawad A. Alsuliman in et al (2019) investigated the most common reasons of delays. They found that, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties can cause the delays and effect the execution plan in construction project. A construction project is commonly admitted as successful when project completed on time, with Drawings & Designs and also provided specifications from stakeholder/-Client. However, most of the projects did not finish as the expected timetable due to delay of Non Availability of Drawings & Designs. Tsegay Gebrehiwet, Hanbin Luob in et al (2017) found that the delays due to Non-Availability of drawings & designs effected the project by various magnitudes. They investigated the delays reasons and its sub groups by Causes of delay v/s Chance of occurrence on Pre-construction Phase, Construction Phase & also with Post -construction Phase. Therefore this factor was considered as a major category reasons of delays in construction projects for current research. Lu, Wenxue, Lihan Zhang and Jing Pan has also reported the delays due to conflict between parties/hidden transaction costs in project dispute and its resolutions.

## 2.4 Labour

Construction delays mean a time & cost overrun either beyond the contract or the timeline up for the delivery of the project. In both cases, a delay is usually a costly situation. A lot of research efforts were made to identify the delay causes in different countries. Showed that, Labour-related delay, unskilled Labour, Poor Labour Productivity are the major causes of delays of project. Mohamed M. Marzouk, Tarek I. El-Rasas (2013) Investigated that, delays due to unskilled Labour. Lack of skilled operator cause the project efficiency and effect the flow of work. Pei-Yuan Hsua, Marco Aurisicchioa, Panagiotis Angeloudis (2017, London UK)

investigated how the Lack of skilled operator can affect project flow cycle. To analyze these delays author used (Fault Tree Analysis) method. Whole project depended on manpower efficiency. If manpower or sub-contractors were less expert project will face the issues and due to Unavailability of skilled Labor can cause the delays. Krzysztof Kaczorek (2016), Pei-Yuan Hsua, Marco Aurisicchioa, Panagiotis Angeloudisb (2017- London UK) and David Arditi , Shruti Nayak, Atilla Damci (2016) investigated about Inadequate experience of Sub Contractor & Unavailability of Labour and recommended to increase the capacity of labour by selection of sub-contractors and inadequate experience of Labour. In a Project environment (primary delay) the unexperienced operators can make the delay in structural components of the project. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.5 Change Order Factor

A vital section specified in the construction contract is the performance period or time of project execution, which is established prior to bidding. The successful execution of construction projects within estimated cost and the prescribed schedules depend on sound engineering judgment. The construction projects are less likely to be completed in a specified time. These 'overruns' are caused due to designer changes or errors, user changes, weather and late deliveries. Yang, J.B., Yang, C.C. and Kao, C.K (2010) has elaborated about delays due to Design or Change in Work Order by Owner. Current construction projects are complex requiring the support of the design and construction profession. Aysha Batool, Faisal Abbass (2017) AT-EL and Tsegay Gebrehiwet, Hanbin Luo (2017) investigated delays due to frequent change orders by owners/design changes, Increase in scope of work ,variation order, frequent variation order from approved BOQ, design or change in work order by owner, changes in government regulation and laws, changes in material types and specification during construction highly caused the delay in the project flow and also effected the project efficiency. Okada, Rachel C., April E. Simons and Anoop Sattineni had investigated that the changes in

the design and construction of government healthcare facilities and the change of government laws and regulation which can almost very less to cause the delay. Better and accurate feasibility report can decrease the possibility of delays which can cause defects, disputes and cost overruns. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.6 Finance Condition

Financial condition is known as budgeted condition of a project or approved cash flow constraints. It involves Running Bills payment to the contractors, Financial Constraints of Contractors, Subcontractors running Bills, Finalization of Rates for Extra Items if scope of work will Increase. The issues regarding these significant factors cause delays in project. If mode of financial constraint of project is strong, the project will be completed in the expected time. Thus, it is important to study the cost factors and to find ways to avoid mistakes for maximum returns from infrastructure construction project. Nabil Al-Hazim, Zaydoun Abu Salem, Hesham Ahmad (2017) investigated the delays due to finance related reasons. They used a methodology to make ranking for each factor and arranged them according to its importance. Also Aysha Batool, Faisal Abbass (2017) have reported the different delay causes in their research of hydro power projects, such as, Allai Khwar (HPP), Duber Khwar (HPP) and Khan Khwar (HPP). They elaborated the reasons of delays and ranked the reason; delayed payment by client (delays in release of funds by the Government) as 3rd most top delay reasons. According to their research study of Hydro Power Projects in Pakistan, they found that all the three projects were PSDP (Public Sector Development Programs) funded projects and it was the prime duty of Govt. to release payments to contractor according to the terms and conditions of contract for the completion of project. However, Govts poor financial planning resulted the delays in payments which in turn to delayed the projects. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.7 Weather/Environment Related

Weather conditions e.g. heavy rains, snow, hail, wind, extreme cold, extreme heat; reasons can cause the delay of a project. The people which are involved in a construction contract, cannot control the weather, they can only anticipate and forecast the possibility of adverse weather and address it in their contracts. Weather can affect the performance and wear and tear of construction equipment. Bergantios, G. and Lorenzo, L. (2019) has discussed about delays regarding unforeseen weather condition that this cause can affect the project performance very commonly. Dry weather can increase the amount of dust on the job site, which can jam and clog machinery. Strong winds can strain equipment and cause breakage. And hot weather can reduce the worth of materials like sealants and mortar. Pier Luigi Guida, Giovanni Sacco (2019) considered more delay causes in construction projects and provided the method for better project control. Delays caused by heavy raining or snowing can be excused, but not compensated (by the Owner). Aysha Batool , Faisal Abbas (2017), David Arditi, Shruti Nayak, Atilla Damcihas (2016) and also Krzysztof Kaczoreka (2016) discussed and investigated the delay causes concerning Weather & Environment condition situation on site. They used empirical methodology such as NVivo Analysis, Empirical research, decision model, Time impact analysis, window analysis to mitigate the delays due to lack of long term planning and execution strategies, lack of measures regarding unforeseen weather condition. Guida, P.L. and Sacco, G.(2019) has investigated the impact of delay due to flood (force majeure). They recommended to adopt proper safety weather measures and remedial preventive action to mitigate and lessen the probability of delays. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.8 Site Condition

Site condition issues are mainly different on every project. Site unforeseen conditions are due to accidents or may be due to lack of site management safety

measures. Subsurface conditions (e.g., soil, high water table, etc.) can cause various effects on project time. Mohamed M. Marzouk (2012), Tarek I. El-Rasas assessed the reason of delays impact due to an accident during construction due to negligence on site. Numerical data was expressed as median and range to compare among three groups of respondents (owners, consultants and contractors) by using different ways of source. Krzysztof Kaczorek (2016) also discussed site accidents due to lack of safety measures by making decision model analysis to relocate the impact of delay. Aysha Batool (2017), Faisal Abbas mentioned Unforeseen Ground Condition and its effectiveness in construction projects. Nabil Al-Hazim, Zaydoun Abu Salem, Hesham Ahmad (2017) also discussed delay causes. They identified about 20 major causes and showed the ranking for each factor arranged according to their importance one of these is Unforeseen Ground Condition. David Arditi , Shruti Nayak, Atilla Damci in (2016) and Ahmed Senoucia, Alaa Ismailb, Neil Eldina (2016) did quantitative analysis about unforeseen ground condition impact & effect in construction project that how much this delay can cause issues for the completion of project. David Arditi , Shruti Nayak, Atilla Damci (2016) adopted the method of Comparison of the organizational culture of construction companies located in the U.S. and India. Ahmed Senoucia, Alaa Ismailb, Neil Eldina investigated to calculate the set of data from 122 Qatari public construction projects which were provided by ASHGHAL. ANOVA method was used for data analysis and inference. The analysis showed that the cost overruns and delays were not significant at level of 0.05 with respect to project type (i.e., building, road, or drainage), category (new or maintenance) and size. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.9 Land Issues

Land issue is a potentially important impact category in life cycle assessment (LCA) studies of buildings. In 2017, Aysha Batool, Faisal Abbas investigated about land Possession Issues in their research and evaluated the delay causes due

to this issue. Their scenario showed misplaced priorities of successive Governments and lack of long term planning and implementation strategies. Jyh-Bin Yang, Chi-Cheng Yang, Chih-Kuei Kao (2009) investigated that Restricted Access at site in category of Negotiation and signing of concession agreement of land rental fee, rigid land rental fee, dispute on land usage, delayed land liberation schedule are the main issues to delays in construction projects. Pei-Yuan Hsua, Marco Aurisicchioa and Panagiotis Angeloudisb (2017) discussed & considered the delay causes due to Prohibited Area by using root Cause analysis. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.10 Approval Issues With Client

The causes of delays related to Approval issues with client in construction projects are many and varied; Shop Drawings and Samples approvals from client, approval of Completed Work by Client, financial issues regarding Payments of Running Bills are the most prominent issue in each project. Krzysztof Kaczoreka (2016) investigated and concluded the Shop Drawings and Samples approval at passing stage. He used a profound analysis of the available literature sources. His presented methodology will be useful for process of estimating the cumulative effect of the factors generating the delay on construction sites. Mohamed M. Marzouk, Tarek I. El-Rasas (2012) discussed delays due to approval of Shop Drawings and Samples related by client. Hemanta Doloi, Anil Sawhney, K.C. Iyer, Sameer Rentala (2012) discussed about Process related delays: e.g. Delay in approval of shop drawings and samples, Delay in running bill payments and acceptance to approval of completed work to client. Aysha Batool, Faisal Abbas AT-EL (2017) investigated the delays due to Acceptance/Passing of Completed Work by Client and located the delays impact and effect by using the relative indexes i.e. Relative Frequency Index (RFI) and the Relative Severity Index (RSI). Frequency of occurrence of each delay cause and Severity degree of cause's impact on project duration were calculated for each delay cause. From comparison of ranking of each cause by using

Independent Relative Importance Index (IRII), it has been concluded that Delayed payment by client (Delays in release of funds by the Government) is ranked the 3rd most top delay reasons in 8 reviewed researches (42%). Therefore this factor was considered as a major category reasons of delays in construction projects for current research. Therefore this factor was considered as a major category reasons of delays in construction projects for current research.

## 2.11 Management Decision Making within Organization

In a construction business, the most common causes of delays due to management decisions made within organization. As a rule, the decision making process is made more complicated due to certain conditions specific for civil engineering. With such diverse decision situations, it is recommended to apply various decision making support methods. Tsegay Gebrehiwet (2017), Hanbin Luo (2012) Mohamed M. Marzouk, Tarek I. El-Rasas investigated and considered that, most delays were caused due to Approval of Completed work by Client (e.g. Stage Passing) and the highest probability of occurrence in Pre-construction stage, Construction Stage, Post-construction stage. They also discussed the consequences of delays due to Approval of Shop Drawings and Samples. Jawad A. Alsuliman (2019) had also examined the list of different delay causes by their groups gathered from literature for different types of construction in different countries. He discussed the delays due to frequent disputes between project parties and due to poor coordination among parties.

Ghazi Saad A Elawi, Mohammed Algahtany, Dean Kashiwagi (2016) et al investigated delays due to slow decision making by owner. Their aim was to identify causes of delay in Gulf Countries Construction (GCC) industry and therefore, used a quantitative approach to analyze the delay factors and concluded that the Owner-related delay has 49.2% & 30 frequency. Aibinu, A.A. and Jagboro, G.O., (2002) had reported the causes about slow decision making and late delivery of site.

Aysha Batool, Faisal Abbas et al (2017) considered the delays issue due to slow decision making by owner, Coordination problems/poor communication among Parties, Lack of communication between parties, Problems with subcontractors causes frequent change of sub-contractor. Also Hemanta Doloi, Anil Sawhney, K.C. Iyer , Sameer Rentala (2012) repetitively investigated the delays due to Poor coordination among parties and Frequent change of sub-contractors in group of Human related delay and Unrealistic inspection and testing methods. Tsegay Gebrehiwet, Hanbin Luo (2017) also enlisted the reasons of delays which effected the flow of completion of running project. According to Tsegay Gebrehiwet, Hanbin Luo, Contractor related delays due to Poor communication and coordination, Finalizing of rates for extra items due to Inflation/price increases in materials can affect the project time frame.

## 2.12 Summary

Many authors investigated and repeated the frequent delay causes that can impact and effect the running construction project. According to various literature papers, authors enlisted or generated the different causes of delays and also identified the critical delays factors/reasons for the preparation of questionnaires. Significant amount of work has already been done on causes of construction delay and there is a well-documented and peer-reviewed set of delay causes available in the literature. A questionnaire was prepared by incorporating delay causes which were reported in the literature. A total of 51 delay reasons were identified in this research. Further, the discussion about preparation of questionnaire/instruments and data collection will elaborate the responses which were collected from different literatures.

# Chapter 3

# Preparation of Research Instruments

## 3.1 Introduction

Questionnaire was made from different literatures and discussions were carried out about different categories of delay causes. The preparation of research instruments was established from different literatures related to the parameters of this topic. From literature, the possible delays were identified to detect the different kind of reasons based on their sub-categories. Reasons of delays were highlighted which caused the late delivery of construction project.

Further to analyze the causes of delays results that the researchers had obtained and recommended about corrective or preventive action plans and remedial action plans.

From literature study, the 11 categories were produced related to Equipment, Material, Management, Labour, Change Order Factor, Finance Condition Weather/Environment Related, Site Condition related, related to Land Issues, Approval Issues with Client and related to Management Decision Making within Organization which were based on 51 causes of delays.

## 3.2 Scale Utilization for Impact Identification of Delays Causes

The delays were categorized according to their rating scale which indicated the impact of delay cause in construction project. The Likert scale is a five (or seven) point scale which is utilized to permit the person to communicate the impact they concur or differ with a specific statement and respondents choose one option that best aligns with their view. It is often used to measure respondents' attitudes by asking the extent to which they agree or disagree with a particular question or statement. Following rating scale was used: Very High ***(5)***, High **(4)**, Medium **(3)**, Low ***(2)*** and Very Low ***(1)***.

After all of this, the following steps were generated and were established to highlight the possible delays reason and its sub categories:

## 3.3 Identification of Delay Reasons by Categories

### 3.3.1 Equipment

Equipment are common and mandatory requirement in construction projects. Generally, various types of equipment are used in the construction industry e.g. Excavators, Backhoe, Dragline Excavator, Bulldozers, Graders, Wheel Tractor Scraper, Trenchers, Loaders and Transit Mixers etc. Different equipment has different critical issues in construction projects. Some of the identified reasons which can cause delays are following.

(1) Shortage of Equipment

(2) Unavailability of Efficient Equipment

(3) Inefficient Use of Equipment

(4) Procurement of Equipment

### 3.3.2 Material

Construction material is very highly prerequisite requirement of any construction project, i.e. Sand, steel, concrete, cable, pipes, lightweight fittings, etc. related to material, different critical issues faced in construction projects are as follows:

(1) Shortage of Material

(2) Improper Storage of Material leading Damages

(3) Delay in Material to be supplied by the Owner

(4) Delay in Material Procurement by Contractor

### 3.3.3 Management

Project efficiency is dependent on strong management, internal communications, site management and well managed plan. Some management issues were established which create problems and can cause the delays are following:

(1) Issuance of LOA

(2) Issues of Planning & Scheduling

(3) Unqualified Work Staff

(4) Poor Site Management

(5) Conflicts with Owner & Other Parties

(6) Non Availability of Drawings & Designs on time

### 3.3.4 Labour

Labour acts as spine of the project. Labour means the number of people working for service. Project totally depends on labours work efficiency. But project also faces the delays due to various reasons related to Labour.

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unskilled Labour, Lack of Skilled operator, inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity.

The reasons were established that can cause delays on project site are following:

(1) Unskilled Labour

(2) Lack of Skilled operator

(3) Inadequate experience of Sub Contractor

(4) Unavailability of Labour

(5) Poor Labour Productivity

### 3.3.5 Change Order Factor

Change order factor is the main reason of delays in every project which has higher probability to cause the delays of the project. The following common reasons of Change factor order were established:

(1) Increase in scope of work

(2) Variation Order

(3) Frequent Variation Order from Approved BOQ

(4) Design or Change in Work Order by Owner

(5) Changes in Government regulation and Laws

(6) Changes in Material types and Specification during Construction

(7) Change in Material Prices or Price escalation

### 3.3.6 Finance Condition

Project finance is the pivotal element of the projects semi-permanent infrastructure, industrial comes and public services employing a non-recourse or restricted recourse money structure. Related to finance condition following reasons were established.

(1) Running Bills payment to the contractors (Cash Flow)

(2) Financial Constraints of Contractors

(3) Subcontractors running Bills issue

(4) Delay in Finalization of Rates for Extra Items

### 3.3.7 Weather/Environment Related

Weather has an effect on the performance and wear and tear of construction instrumentation. Dry weather increases the amount of dirt on the task work site, which might jam and clog machinery. Sturdy winds strain the instrumentation and cause breakage. And atmospheric condition also scale back the effectiveness of materials like sealants and mortar. Some of the following reasons were identified:

(1) Unforeseen Weather condition

(2) Flood

(3) Snow

(4) Extreme Hot Weather Condition

### 3.3.8 Site Condition

Delays occur due to unexpected events on site. Such events may take place due to different problems on site and can cause the delays of project. Related to site conditions, following delay reasons were established:

(1) Site Accidents due to negligence

(2) Site Accidents due to Lack of Safety Measures

(3) Unforeseen Ground Condition

### 3.3.9 Land Issues

Land possession is a highly mandatory asset of any construction project. The land can be of Government, Private sector or any public sector. Some Land issues which were identified and established that may cause the delays are following:

(1) Possession Issue

(2) Restricted Access at site

(3) Prohibited Area

### 3.3.10 Approval Issues with Client

Client is the main stakeholder of any project. Project completely depends on Client relationship, communication and its approval. But some issues which may cause the delays of the project by Client interference are following:

(1) Shop Drawings and Samples

(2) Acceptance/Passing of Completed Work by Client

(3) Payments of Running Bills

### 3.3.11 Management Decision Making within Organization

The whole project efficiency, Running Flow and performance is totally based on management decision making. If decision making is strong, project performance

will go smooth and in a flow. The delays related to management decision making within organization, are as following:

(1) Approval of Completed work by Client (e.g. Stage Passing)

(2) Approval of Shop Drawings and Samples

(3) Finalizing of rates for extra items.

(4) Frequent Change of Sub Contractor

(5) Poor Coordination among Parties

(6) Unrealistic Inspections and Testing Methods proposed in Contracts

(7) Handing Over to Client/Customer

(8) Slow Decision from Owner

According to this research, the questionnaire was prepared by incorporating the key delay causes reported in the literature. A total of 51 delay reasons were identified in this research. Further the discussion will be carried about questionnaire responses and its analysis. The established questionnaire sample is provided in Appendix A table 1 below.

## 3.4 Method of Analysis

- Literature Review.
- Compile main and subcategories of delays.
- To collect data from construction industry executives.
- Describe and inferences the data.
- To make groups of respondents by demographically.
- Evaluate the impact of each delay reason.

- Count the impact value against number of respondents for each unstructured reasons.
- Summarize the impact value of collected data.
- Draw the conclusions summary of data by graphical expression.

## 3.5 Summary

Questionnaire was established by extracted delays reason from literatures. The generated questionnaire sample was related to construction project delays. From literature analysis, the list of highly probable causes of delays in a construction project were identified. Next, the number of participant responses were identified. This survey was conducted to collect the responses from different Private organizations, Government sectors and industrial sectors (e.g. Client, Consultant, Contractor, Sub-Contractor, supplier & Academician) and the different area of fields of organization (e.g. Architecture, Building design, Infrastructure management, Construction management, Quantity surveying, Engineering, Site execution, Project management & financial consultancy). All the group of participants are linked with different types of construction (e.g. Residential, Commercial, Road-/Highway, Infrastructure, High Rise/Apartments, Multistory).

# Chapter 4

# Result and Analysis

## 4.1 Introduction

Data was collected after visiting the different management levels participants of organizations. (Corporate, Senior, Intermediate & Field) having different experience of professions. In this survey, real time data was collected for analyzing purpose and to study the differences in observations of the different respective representatives (i.e. Management level members having professional experienced) of organization, namely: owners, contractors and consultants. The analysis is based on major phase regarding between Management Positions members having up to 60 Years professional experience. The position depended on, Corporate, Senior, Intermediate & Field Level.

## 4.2 Demographics of Respondents

The results were established through collection of data from experts of Pakistan construction industry including corporate, senior, intermediate and field management levels. The data was collected from about **110** public and private company executives, middle level managers and working professionals. Total **9** number of

Respondents (8%) were from Corporate Level respondents having 30 Years' Experience, **48** number of Respondents (44%) From Senior having Up to 60 Years Experience, **40** number of Respondents (36%) those having 15 Years' Experience were from Intermediate level and **13** number of Respondents (12%) having Less than 15 Years Experience of Field Level participants. As shown in Table 4.1

Table 4.1: Demographics of Respondents

| S.No | Types of Respondents | Number of Respondents Out of 110 Sample Size | Years of Experience |
|---|---|---|---|
| 1 | Corporate Level | 9 | 30 Years |
| 2 | Senior Level | 48 | 60 Years |
| 3 | Intermediate Level | 40 | 15 Years |
| 4 | Field Level | 13 | Less than 15 Years |

## 4.3 Corporate Level vs Delay Causes

### 4.3.1 Equipment

This category shows all the reactions against Shortage of Equipment, Unavailability of Efficient Equipment and Inefficient Use of Equipment. Equipment analysis be subjected to Position Member v/s Equipment Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Equipment, Unavailability of Efficient Equipment, Inefficient Use of Equipment and Procurement of Equipment.

Figure 4.1 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Equipment observations. These participants had given their responses against the established reasons related to equipment.

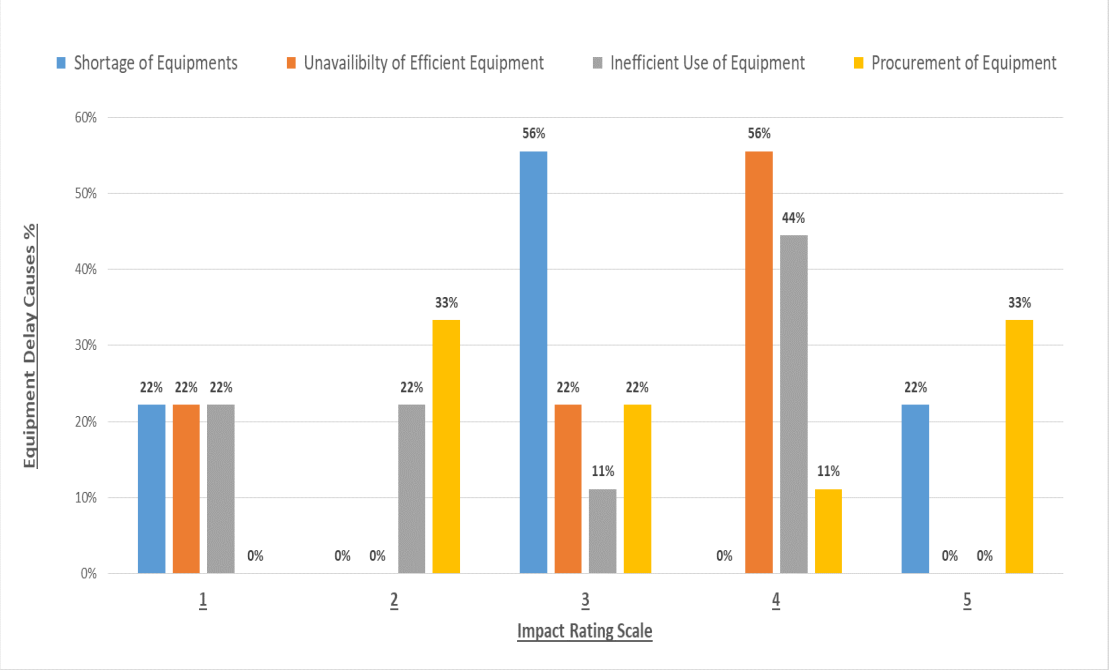


FIGURE 4.1: Rating Impact vs Causes of Delays due to Equipment

**Corporate Level:** The corporate level managers had observed the following probabilities:

According to Rating Impact 1 (Very Low):

(a) A shortage of Equipment has 22% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 22%

(c) Inefficient Use of Equipment has 22%

(d) And Procurement of Equipment has 0% magnitude.

According to Rating Impact 2 (Low):

(a) A shortage of Equipment has 0% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 0%

(c) Inefficient Use of Equipment has 22%

(d) And Procurement of Equipment has 33% magnitude.

According to Rating Impact 3 (Medium):

(a) A shortage of Equipment has 56% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 22%

(c) Inefficient Use of Equipment has 11%

(d) And Procurement of Equipment has 22% magnitude.

According to Rating Impact 4 (High):

(a) A shortage of Equipment has 0% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 56%

(c) Inefficient Use of Equipment has 44%

(d) And Procurement of Equipment has 11% magnitude

According to Rating Impact 5 (Very High):

(a) A shortage of Equipment has 22% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 0%

(c) Inefficient Use of Equipment has 0%

(d) And Procurement of Equipment has 33% magnitude

### 4.3.2 Material

This category shows all the reactions against Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner, Delay in Material Procurement by Contractor. Material analysis be subject to Management Level v/s Material Reasons:

In this category of delays, to understand that how outcomes of responses were established by from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner and Delay in Material Procurement by Contractor.

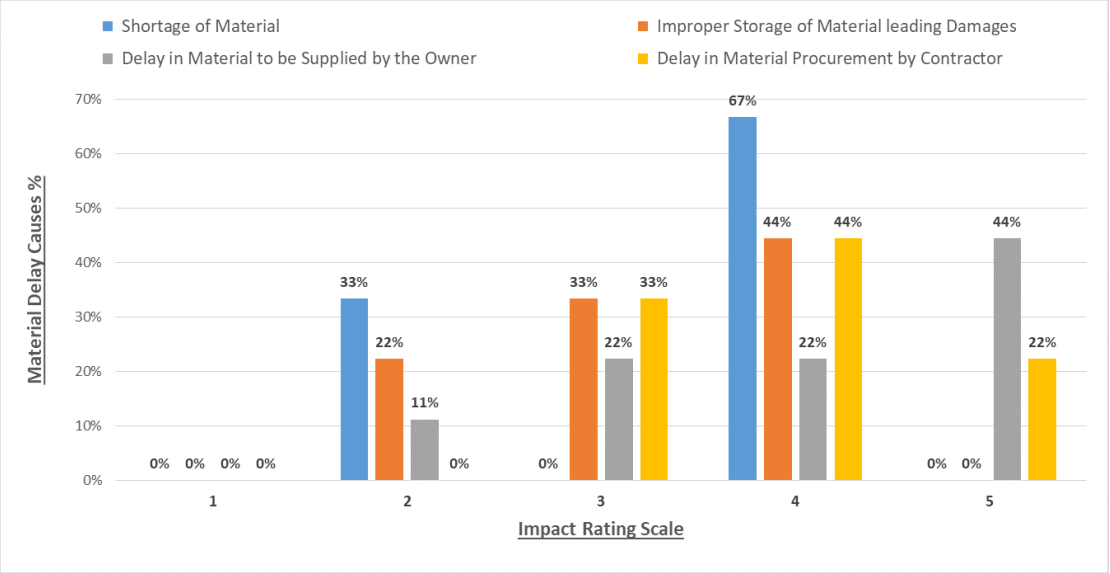


FIGURE 4.2: Rating Impact vs Causes of Delays due to Material

Figure 4.2 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Material observations. These participants have given their responses against the established reasons related to material.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A shortage of Material has 0% probability of occurrence

(b) Similarly, a total 0% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 0%.

According to Rating Impact 2 (Low):

(a) A shortage of Material has 33% probability of occurrence

(b) Similarly, a total 22% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 11%

(d) And Material Procurement by Contractor has 0%.

According to Rating Impact 3 (Medium):

(a) A shortage of Material has 0% probability of occurrence

(b) Similarly, a total 33% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 22%

(d) And Material Procurement by Contractor has 33%.

According to Rating Impact 4 (High):

(a) A shortage of Material has 67% probability of occurrence

(b) Similarly, a total 44% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 22%

(d) And Material Procurement by Contractor has 44%.

According to Rating Impact 5 (Very High):

(a) A shortage of Material has 0% probability of occurrence

(b) Similarly, a total 0% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 44%

(d) And Material Procurement by Contractor has 22%.

### 4.3.3 Management

This category shows all the reactions against Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time. Management analysis be subject to Management Level v/s Management Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time.

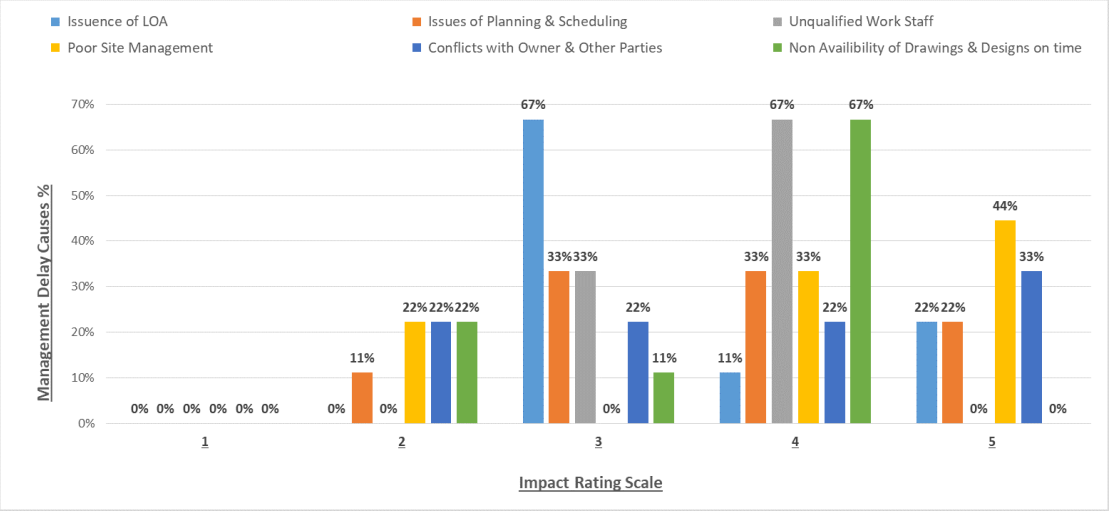


FIGURE 4.3: Rating Impact vs Causes of Delays due to Management

There has a different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members vs Management observations. These

participants had given their responses against the established reasons related to Management. As shown in Figure 4.3. **Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) An Issuance of LOA has 0% of probability to delay cause.

(b) A total of 0% due to Issues of Planning & Scheduling

(c) A total 0% due to Unqualified Work Staff.

(d) A total 0% due to Poor Site Management.

(e) A total 0% due to Conflicts with Owner and Other Parties.

(f) A total 0% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 2 (Low):

(a) An Issuance of LOA has 0% of probability to delay cause.

(b) A total of 11% due to Issues of Planning & Scheduling

(c) A total 0% due to Unqualified Work Staff.

(d) A total 22% due to Poor Site Management.

(e) A total 22% due to Conflicts with Owner and Other Parties.

(f) A total 22% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 3 (Medium):

(a) An Issuance of LOA has 67% of probability to delay cause.

(b) A total of 33% due to Issues of Planning & Scheduling

(c) A total 33% due to Unqualified Work Staff.

(d) A total 0% due to Poor Site Management.

(e) A total 22% due to Conflicts with Owner and Other Parties.

(f) A total 11% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 4 (High):

(a) An Issuance of LOA has 11% of probability to delay cause.

(b) A total of 33% due to Issues of Planning & Scheduling

(c) A total 67% due to Unqualified Work Staff.

(d) A total 33% due to Poor Site Management.

(e) A total 22% due to Conflicts with Owner and Other Parties.

(f) A total 67% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 5 (Very High):

(a) An Issuance of LOA has 22% of probability to delay cause.

(b) A total of 22% due to Issues of Planning & Scheduling

(c) A total 0% due to Unqualified Work Staff.

(d) A total 44% due to Poor Site Management.

(e) A total 33% due to Conflicts with Owner and Other Parties.

(f) A total 0% probability of delays due to Non Availability of Drawings & Designs on time

### 4.3.4 Labour

This category shows all the reactions against Unskilled Labour, Lack of Skilled operator, Inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity delay which were indicated from the participant as per his encounter or extend scope. Labour analysis be subject to Management Level v/s Labour Reasons.

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unskilled Labour, Lack of Skilled operator, inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity.

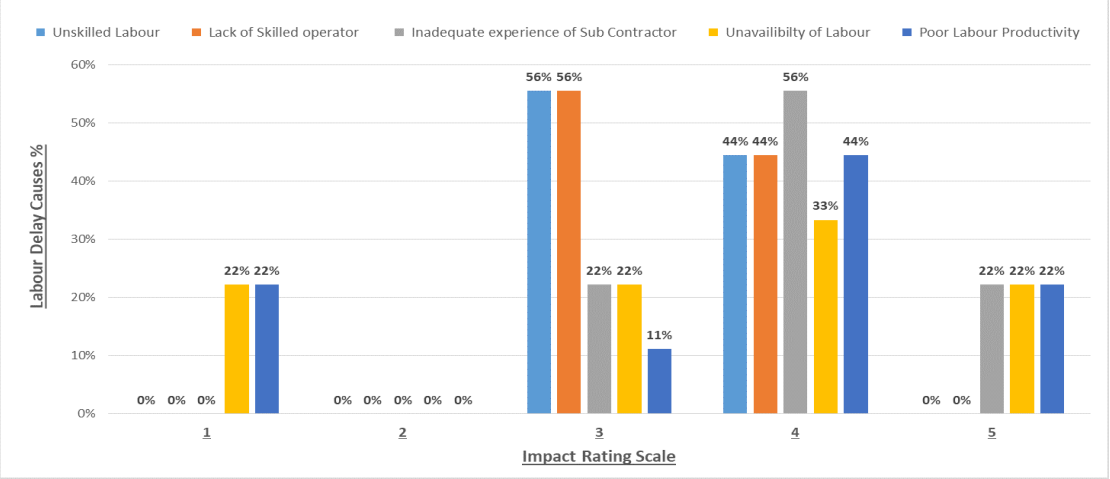


FIGURE 4.4: Rating Impact vs Causes of Delays due to Labour

Figure 4.4 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Labour observation. These participants have given their responses against the established reasons related to Labour.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% of probability of delays was from Unskilled Labour.

(b) A total of 0% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 0% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 22% were due to Delay Poor Labour Productivity

According to Rating Impact 2 (Low):

(a) A total 0% of probability of delays was from Unskilled Labour.

(b) A total of 0% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 0% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 0% delays were due to Delay Unavailability of Labour.

(e) And Total 0% were due to Delay Poor Labour Productivity

According to Rating Impact 3 (Medium):

(a) A total 56% of probability of delays was from Unskilled Labour.

(b) A total of 56% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 22% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 22% delays were due to Delay Unavailability of Labour.

(e) And Total 11% were due to Delay Poor Labour Productivity

According to Rating Impact 4 (High):

(a) A total 44% of probability of delays was from Unskilled Labour.

(b) A total of 44% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 56% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 33% delays were due to Delay Unavailability of Labour.

(e) And Total 44% were due to Delay Poor Labour Productivity

According to Rating Impact 5 (Very High):

(a) A total 0% of probability of delays was from Unskilled Labour.

(b) A total of 0% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 22% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 22% delays were due to Delay Unavailability of Labour.

(e) And Total 22% were due to Delay Poor Labour Productivity

### 4.3.5 Change Order Factor

This category shows all the reactions against Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification During Construction, Change in Material Prices or Price escalation and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Change Order Factor analysis be subject to Management Level v/s Change Order Factor Reasons.

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Increase in scope of

work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification during Construction, Change in Material Prices or Price escalation.

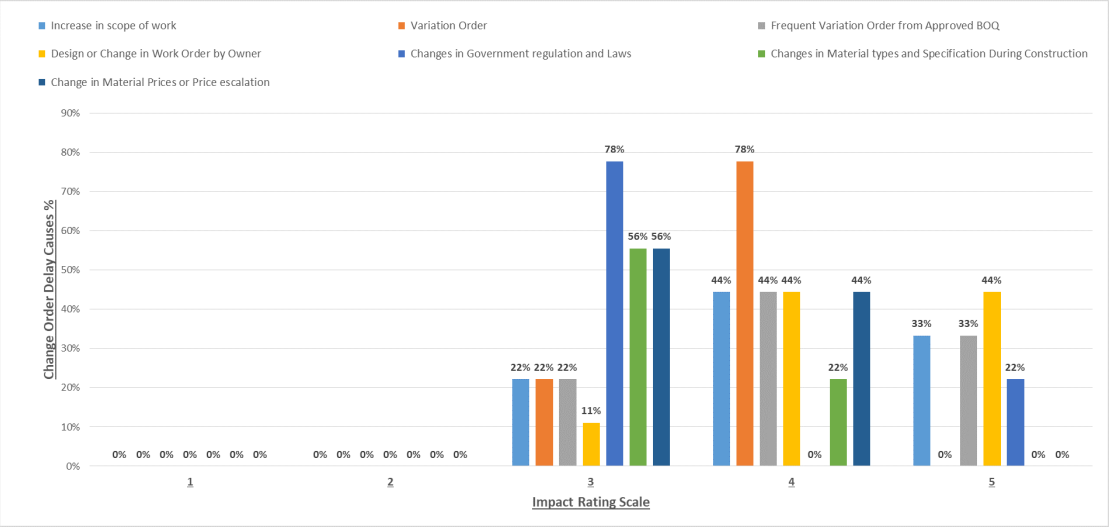


FIGURE 4.5: Rating Impact vs Causes of Delays due to Change Order Factor

Figure 4.5 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Change Order Factor observations. These participants have given their responses against the established reasons related to Change Order Factor.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% Probability of delays was from Increase in scope of work

(b) A total of 0% delays were due to Variation Order

(c) A total 0% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 0% delays were due to Design or Change in Work Order by Owner

(e) A total 0% delays were due to Changes in Government regulation and Laws

(f) A total 0% delays were due to Changes in Material types and Specification During Construction

(g) And total 60% were due to Change in Material Prices or Price escalation

According to Rating Impact 2 (Low):

(a) A total 0% Probability of delays was from Increase in scope of work

(b) A total of 0% delays were due to Variation Order

(c) A total 0% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 0% delays were due to Design or Change in Work Order by Owner

(e) A total 0% delays were due to Changes in Government regulation and Laws

(f) A total 0% delays were due to Changes in Material types and Specification During Construction

(g) And total 60% were due to Change in Material Prices or Price escalation

According to Rating Impact 3 (Medium):

(a) A total 22% Probability of delays was from Increase in scope of work

(b) A total of 22% delays were due to Variation Order

(c) A total 22% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 11% delays were due to Design or Change in Work Order by Owner

(e) A total 78% delays were due to Changes in Government regulation and Laws

(f) A total 56% delays were due to Changes in Material types and Specification During Construction

(g) And total 56% were due to Change in Material Prices or Price escalation

According to Rating Impact 4 (High):

(a) A total 44% Probability of delays was from Increase in scope of work

(b) A total of 78% delays were due to Variation Order

(c) A total 44% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 44% delays were due to Design or Change in Work Order by Owner

(e) A total 0% delays were due to Changes in Government regulation and Laws

(f) A total 22% delays were due to Changes in Material types and Specification During Construction

(g) And total 44% were due to Change in Material Prices or Price escalation

According to Rating Impact 5 (Very High):

(a) A total 33% Probability of delays was from Increase in scope of work

(b) A total of 0% delays were due to Variation Order

(c) A total 33% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 44% delays were due to Design or Change in Work Order by Owner

(e) A total 22% delays were due to Changes in Government regulation and Laws

(f) A total 0% delays were due to Changes in Material types and Specification During Construction

(g) And total 0% were due to Change in Material Prices or Price escalation

### 4.3.6 Finance Condition

This category shows all the reactions against delays Due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Finance Condition analysis be subject to Management Level v/s Finance Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items.

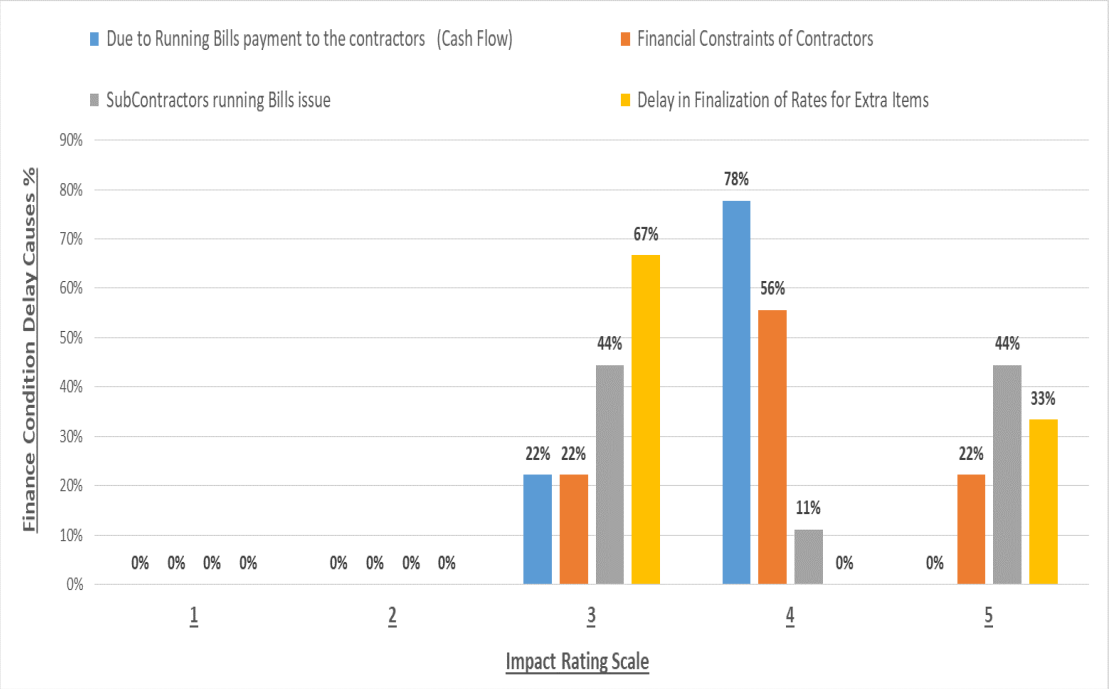


FIGURE 4.6: Rating Impact vs Causes of Delays due to Finance Condition

Figure 4.6 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Finance Condition observations. These participants have given their responses against the established reasons related to Finance Condition.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 0% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

(d) And Total 0% were due to Finalization of Rates for Extra Items.

According to Rating Impact 2 (Low):

(a) A total 0% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 0% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

(d) And Total 0% were due to Finalization of Rates for Extra Items.

According to Rating Impact 3 (Medium):

(a) A total 22% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 22% were due to Financial Constraints of Contractors

(c) A total 44% were due to Subcontractors running Bills issue.

According to Rating Impact 4 (High):

(a) A total 78% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 56% were due to Financial Constraints of Contractors

(c) A total 11% were due to Subcontractors running Bills issue.

(d) And Total 0% were due to Finalization of Rates for Extra Items.

According to Rating Impact 5 (Very High):

(a) A total 0% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 22% were due to Financial Constraints of Contractors

(c) A total 44% were due to Subcontractors running Bills issue.

(d) And Total 33% were due to Finalization of Rates for Extra Items.

### 4.3.7 Weather/Environment Related

This category shows all the reactions against Unforeseen Weather condition, Flood, Snow , Extreme Hot Weather Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Weather/Environment Related analysis be subject to Management Level v/s Weather/Environment Related Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unforeseen Weather condition, Flood, Snow and Extreme Hot Weather Condition.

Figure 4.7 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Weather/Environment Related observations. These participants have given their responses against the established reasons related to Weather/Environment.

**Corporate Level:** The corporate level managers had the following observations:

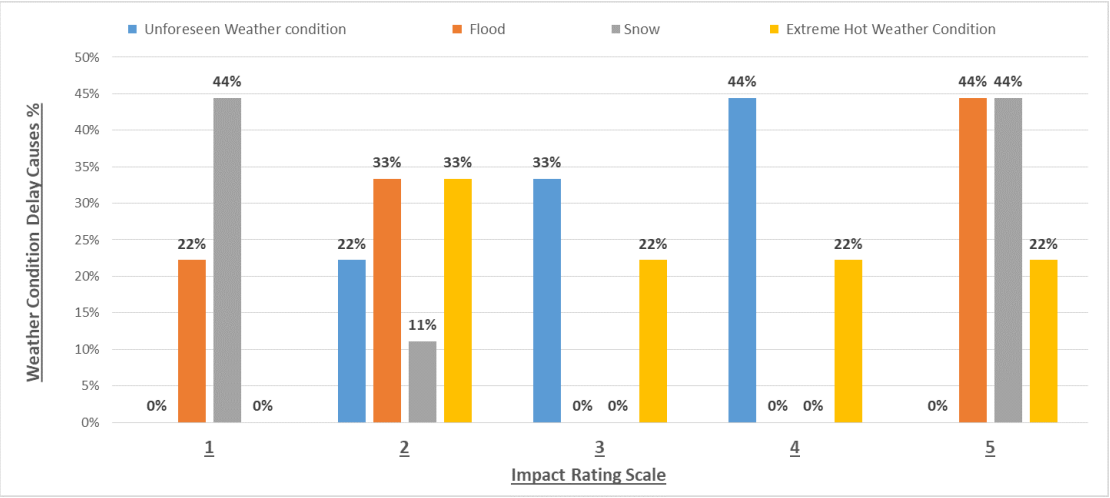


FIGURE 4.7: Rating Impact vs. Causes of Delays Due to Weather/Environment Related

According to Rating Impact 1 (Very Low):

(a) An Unforeseen Weather condition has total 0% probability to cause the delay.

(b) A Flood has total of 22% of probability.

(c) A Snow has 44% due to.

(d) And Total 0% due to Extreme Hot Weather Condition.

According to Rating Impact 2 (Low):

(a) An Unforeseen Weather condition has total 22% probability to cause the delay.

(b) A Flood has total of 33% of probability.

(c) A Snow has 11% due to.

(d) And Total 33% due to Extreme Hot Weather Condition.

According to Rating Impact 3 (Medium):

(a) An Unforeseen Weather condition has total 33% probability to cause the delay.

(b) A Flood has total of 0% of probability.

(c) A Snow has 0% due to.

(d) And Total 22% due to Extreme Hot Weather Condition.

According to Rating Impact 4 (High):

(a) An Unforeseen Weather condition has total 44% probability to cause the delay.

(b) A Flood has total of 0% of probability.

(c) A Snow has 0% due to.

(d) And Total 22% due to Extreme Hot Weather Condition.

According to Rating Impact 5 (Very High):

(a) An Unforeseen Weather condition has total 0% probability to cause the delay.

(b) A Flood has total of 44% of probability.

(c) A Snow has 44% due to.

(d) And Total 22% due to Extreme Hot Weather Condition.

### 4.3.8 Site Condition

This category shows all the reactions against Due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Site Condition analysis be subject to Management Level v/s Site Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude

of reasons against positions members for delays causes due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition.

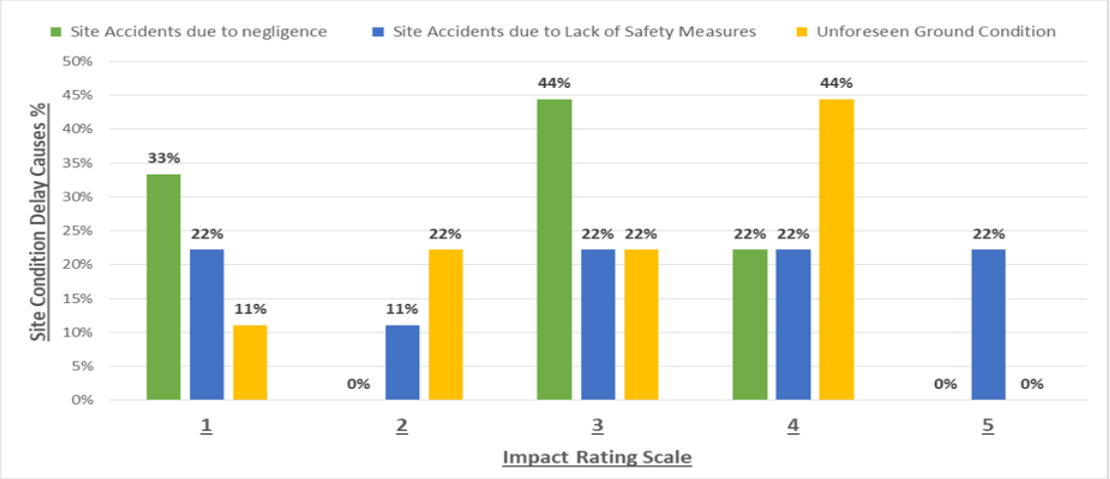


FIGURE 4.8: Rating Impact vs. Causes of Delays due to Site Condition

Figure 4.8 shows the different Experience level of respondent (Up to 30 Years Experienced Members) as per corporate level members Vs. Site Condition observations. These participants have given their responses against the established reasons related to Site Condition.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 33% delays were Due to Possession Issue.

(b) A total of 22% were due to Restricted Access at site.

(c) A total 11% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 11% were due to Restricted Access at site.

(c) A total 22% were due to Prohibited Area.

According to Rating Impact 3 (Medium):

(a) A total 44% delays were Due to Possession Issue.

(b) A total of 22% were due to Restricted Access at site.

(c) A total 22% were due to Prohibited Area.

According to Rating Impact 4 (High):

(a) A total 22% delays were Due to Possession Issue.

(b) A total of 22% were due to Restricted Access at site.

(c) A total 44% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 22% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area.

### 4.3.9 Land Issues

This category shows all the reactions against Due to Possession Issue, Restricted Access at site. Prohibited Area and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Land Issues analysis be subject to Management Level v/s Land Issues Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude

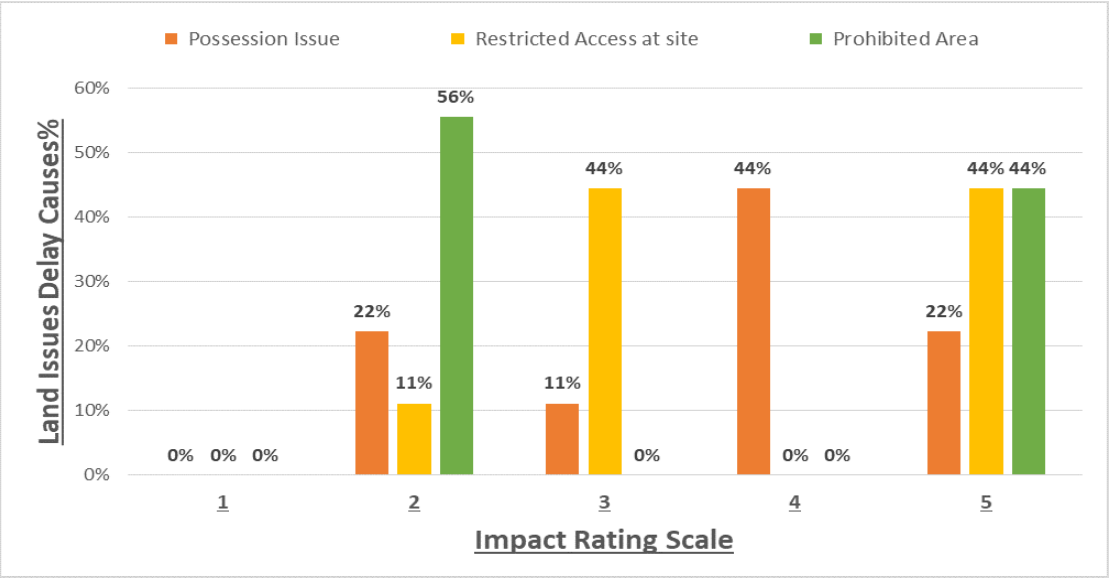


FIGURE 4.9: Rating Impact vs Causes of Delays due to Land Issues

of reasons against positions members for delays causes due to Possession Issue, Restricted Access at site and Prohibited Area.

Figure 4.10 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Land Issues Related observations. These participants have given their responses against the established reasons related to Land Issues.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 0% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 22% delays were Due to Possession Issue.

(b) A total of 114% were due to Restricted Access at site.

(c) A total 56% were due to Prohibited Area.

According to Rating Impact 3 (Medium):

(a) A total 11% delays were Due to Possession Issue.

(b) A total of 44% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area.

According to Rating Impact 4 (High):

(a) A total 44% delays were Due to Possession Issue.

(b) A total of 0% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 22% delays were Due to Possession Issue.

(b) A total of 44% were due to Restricted Access at site.

(c) A total 44% were due to Prohibited Area.

### 4.3.10 Approval Issues With Client

This category shows all the reactions against Due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Approval Issues with Client analysis be subject to Management Level v/s Approval Issues with Client Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant.

This category analysis shows the total magnitude of reasons against positions members for delays causes due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills.

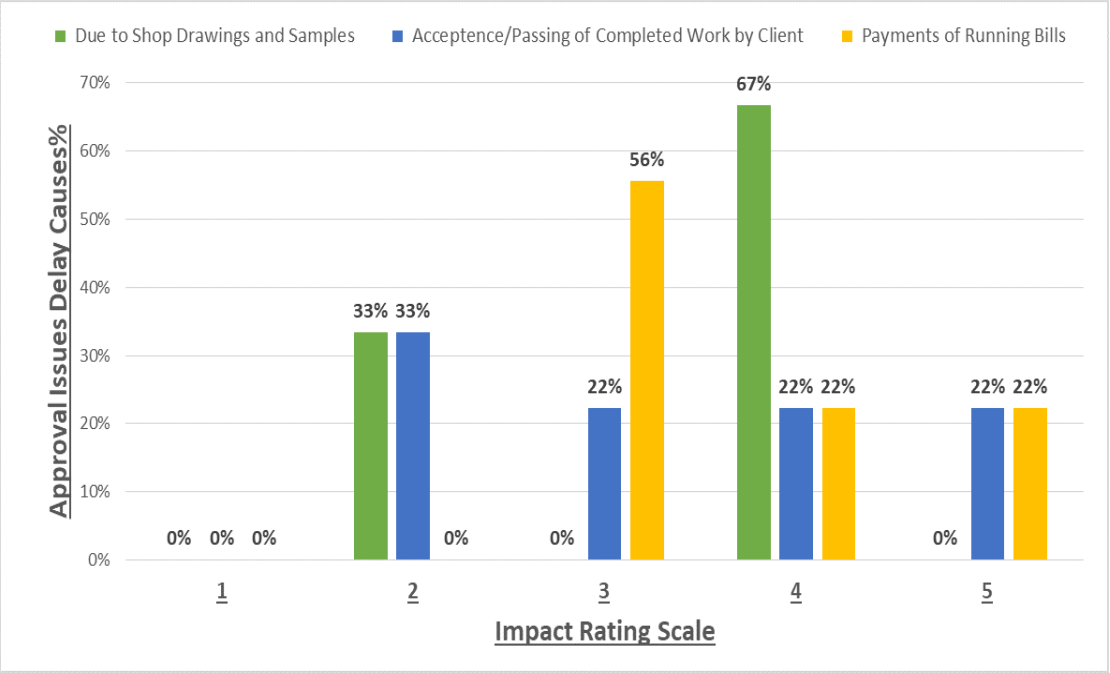


FIGURE 4.10: Rating Impact vs Causes of Delays due to Approval Issues with Client

Figure 4.10 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Approval Issues with Client observations.

These participants have given their responses against the established reasons related to Approval Issues with Client.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Shop Drawings and Samples has total 0% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 0% chance

(c) Payments of Running Bills 0%.

According to Rating Impact 2 (Low):

(a) Delays due to Shop Drawings and Samples has total 33% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 33% chance

(c) Payments of Running Bills 0%.

According to Rating Impact 3 (Medium):

(a) Delays due to Shop Drawings and Samples has total 0% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 22% chance

(c) Payments of Running Bills 56%.

According to Rating Impact 4 (High):

(a) Delays due to Shop Drawings and Samples has total 67% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 22% chance

(c) Payments of Running Bills 22%.

According to Rating Impact 5 (Very High):

(a) Delays due to Shop Drawings and Samples has total 0% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 22% chance

(c) Payments of Running Bills 22%.

### 4.3.11 Management Decision Making Within Organization

This category shows all the reactions against Due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Coordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner and other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Management Decision Making within Your Organization analysis be subject to Management Level v/s Management Decision Making within Your Organization Reasons

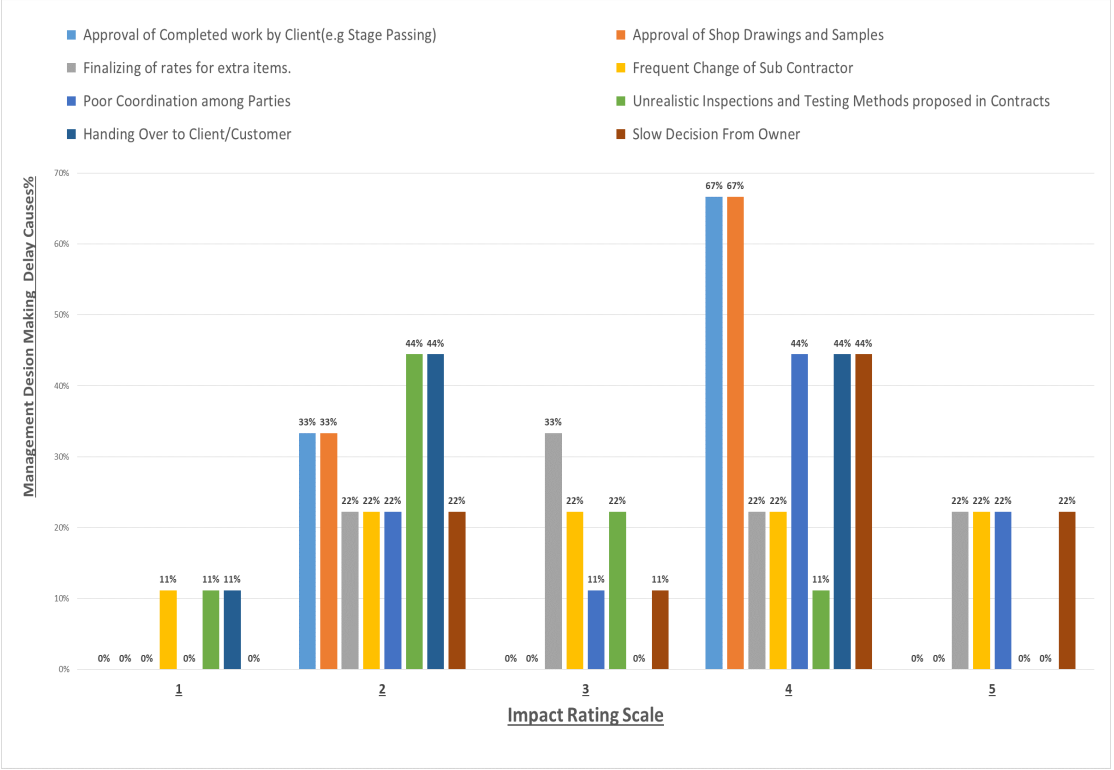


FIGURE 4.11: Rating Impact vs Causes of Delays due to Management Decision Making within Organization

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples,

Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Coordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner.

Figure 4.41 shows the different Experience level of respondents (Up to 30 Years Experienced Members) as per corporate level members Vs Reasons of Management Decision Making within Your Organization observations. These participants have given their responses against the established reasons related to Management Decision Making within Organization.

**Corporate Level:** The corporate level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 0% chance to delay cause.

(d) Frequent Change of Sub Contractor has 11%.

(e) Poor Coordination among Parties has 0% chance.

(f) A total 11% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 11% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 0% probability of occurrence.

According to Rating Impact 2 (Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 33% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 33% of total probability.

(c) Finalizing of rates for extra items also has 22% chance to delay cause.

(d) Frequent Change of Sub Contractor has 22%.

(e) Poor Coordination among Parties has 22% chance.

(f) A total 44% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 44% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 22% probability of occurrence.

According to Rating Impact 3 (Medium):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 33% chance to delay cause.

(d) Frequent Change of Sub Contractor has 22%.

(e) Poor Coordination among Parties has 11% chance.

(f) A total 22% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 0% probability of occurrence.

According to Rating Impact 4 (High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 67% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 67% of total probability.

(c) Finalizing of rates for extra items also has 22% chance to delay cause.

(d) Frequent Change of Sub Contractor has 22%.

(e) Poor Coordination among Parties has 44% chance.

(f) A total 11% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 44% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 44% probability of occurrence.

According to Rating Impact 5 (Very High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 22% chance to delay cause.

(d) Frequent Change of Sub Contractor has 22%.

(e) Poor Coordination among Parties has 22% chance.

(f) A total 0% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 0% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 22% probability of occurrence.

Different level of respondent has assessed the typical probabilities of occurrence of each reason of delays. They concluded that each reason of delay has different magnitude to cause to affect the project performance as per corporate level participants.

## 4.4 Senior Level vs Delay Causes

### 4.4.1 Equipment

This category shows all the reactions against Shortage of Equipment, Unavailability of Efficient Equipment and Inefficient Use of Equipment. Equipment analysis be subjected to Position Member v/s Equipment Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Equipment, Unavailability of Efficient Equipment, Inefficient Use of Equipment and Procurement of Equipment.

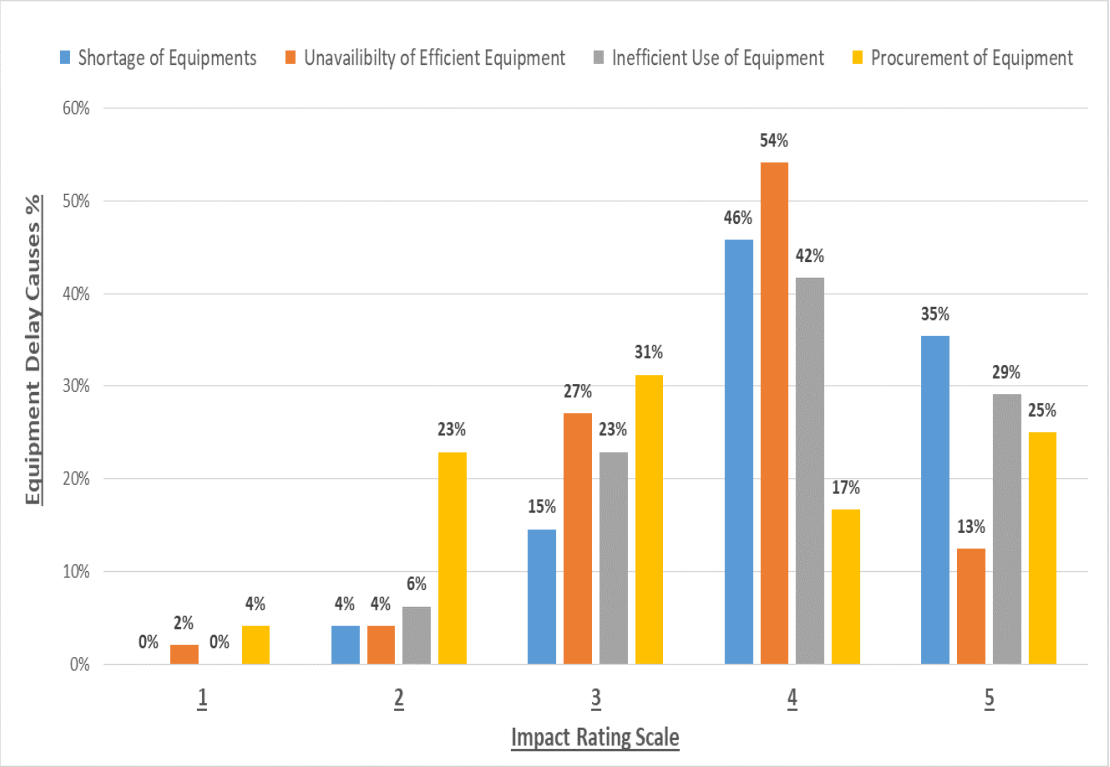


FIGURE 4.12: Rating Impact vs Causes of Delays due to Equipment

Figure 4.12 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Equipment observations. These participants have given their responses against the established reasons related to equipment.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A shortage of Equipment has 0% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 2%

(c) Inefficient Use of Equipment has 0%

(d) And Procurement of Equipment has 4% magnitude.

According to Rating Impact 2 (Low):

(a) A shortage of Equipment has 4% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 4%

(c) Inefficient Use of Equipment has 6%

(d) And Procurement of Equipment has 23% magnitude.

According to Rating Impact 3 (Medium):

(a) A shortage of Equipment has 15% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 27%

(c) Inefficient Use of Equipment has 23%

(d) And Procurement of Equipment has 31% magnitude.

According to Rating Impact 4 (High):

(a) A shortage of Equipment has 46% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 54%

(c) Inefficient Use of Equipment has 42%

(d) And Procurement of Equipment has 17% magnitude

According to Rating Impact 5 (Very High):

(a) A shortage of Equipment has 35% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 13%

(c) Inefficient Use of Equipment has 29%

(d) And Procurement of Equipment has 25% magnitude

### 4.4.2 Material

This category shows all the reactions against Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner, Delay in Material Procurement by Contractor. Material analysis be subject to Management Level v/s Material Reasons:

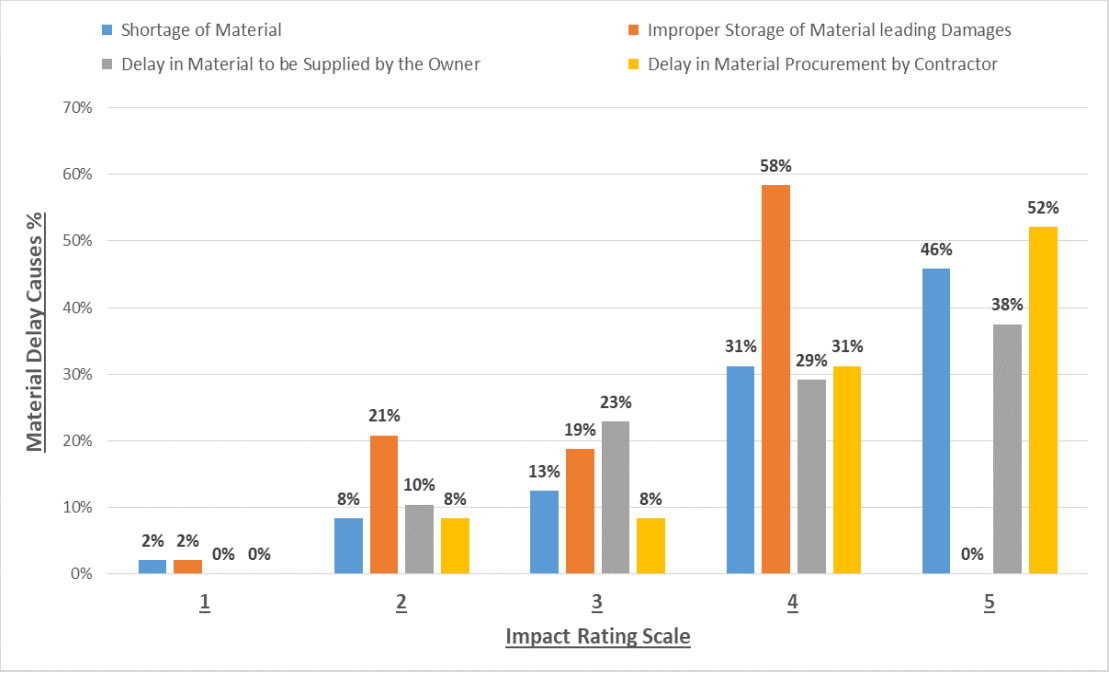


FIGURE 4.13: Rating Impact vs Causes of Delays due to Material Reasons

In this category of delays, to understand that how outcomes of responses were established by from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner and Delay in Material Procurement by Contractor.

Figure 4.13 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per corporate level members Vs Material observations. These participants have given their responses against the established reasons related to material.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A shortage of Material has 2% probability of occurrence

(b) Similarly, a total 2% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 0%.

According to Rating Impact 2 (Low):

(a) A shortage of Material has 8% probability of occurrence

(b) Similarly, a total 21% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 10%

According to Rating Impact 3 (Medium):

(a) A shortage of Material has 13% probability of occurrence

(b) Similarly, a total 19% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 23%

(d) And Material Procurement by Contractor has 8%.

According to Rating Impact 4 (High):

(a) A shortage of Material has 31% probability of occurrence

(b) Similarly, a total 58% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 29%

(d) And Material Procurement by Contractor has 31%.

According to Rating Impact 5 (Very High):

(a) A shortage of Material has 46% probability of occurrence

(b) Similarly, a total 0% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 38%

(d) And Material Procurement by Contractor has 52%.

### 4.4.3 Management

This category shows all the reactions against Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time. Management analysis be subject to Management Level v/s Management Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time.

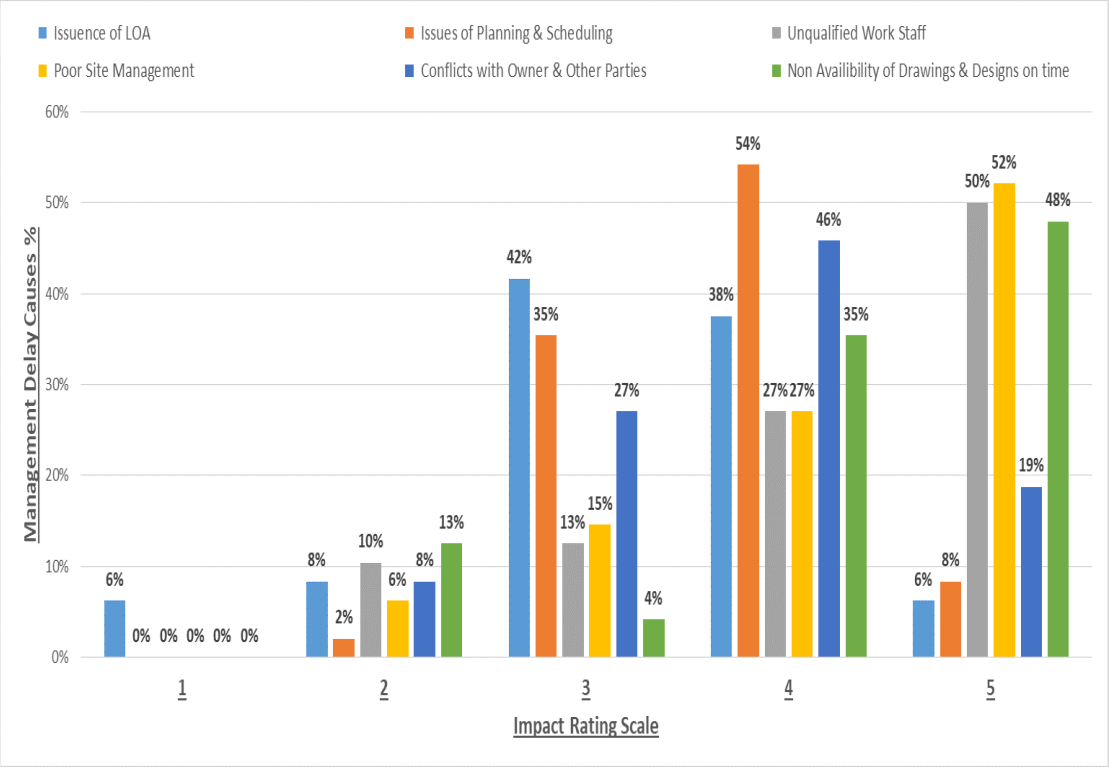


FIGURE 4.14: Rating Impact vs Causes of Delays due to Management

Figure 4.14 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per Senior level members Vs Management observations. These participants had given their responses against the established reasons related to Management.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) An Issuance of LOA has 6% of probability to delay cause.

(b) A total of 0% due to Issues of Planning & Scheduling

(c) A total 0% due to Unqualified Work Staff.

(d) A total 0% due to Poor Site Management.

(e) A total 0% due to Conflicts with Owner and Other Parties.

(f) A total 0% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 2 (Low):

(a) An Issuance of LOA has 8% of probability to delay cause.

(b) A total of 2% due to Issues of Planning & Scheduling

(c) A total 10% due to Unqualified Work Staff.

(d) A total 6% due to Poor Site Management.

(e) A total 8% due to Conflicts with Owner and Other Parties.

(f) A total 13% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 3 (Medium):

(a) An Issuance of LOA has 42% of probability to delay cause.

(b) A total of 35% due to Issues of Planning & Scheduling

(c) A total 13% due to Unqualified Work Staff.

(d) A total 15% due to Poor Site Management.

(e) A total 27% due to Conflicts with Owner and Other Parties.

(f) A total 4% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 4 (High):

(a) An Issuance of LOA has 38% of probability to delay cause.

(b) A total of 54% due to Issues of Planning & Scheduling

(c) A total 27% due to Unqualified Work Staff.

(d) A total 27% due to Poor Site Management.

(e) A total 46% due to Conflicts with Owner and Other Parties.

(f) A total 35% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 5 (Very High):

(a) An Issuance of LOA has 6% of probability to delay cause.

(b) A total of 8% due to Issues of Planning & Scheduling

(c) A total 50% due to Unqualified Work Staff.

(d) A total 52% due to Poor Site Management.

(e) A total 19% due to Conflicts with Owner and Other Parties.

(f) A total 48% probability of delays due to Non Availability of Drawings & Designs on time

### 4.4.4 Labour

This category shows all the reactions against Unskilled Labour, Lack of Skilled operator, Inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity delay which were indicated from the participant as per his encounter or extend scope. Labour analysis be subject to Management Level v/s Labour Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unskilled Labour, Lack of Skilled operator, inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity.

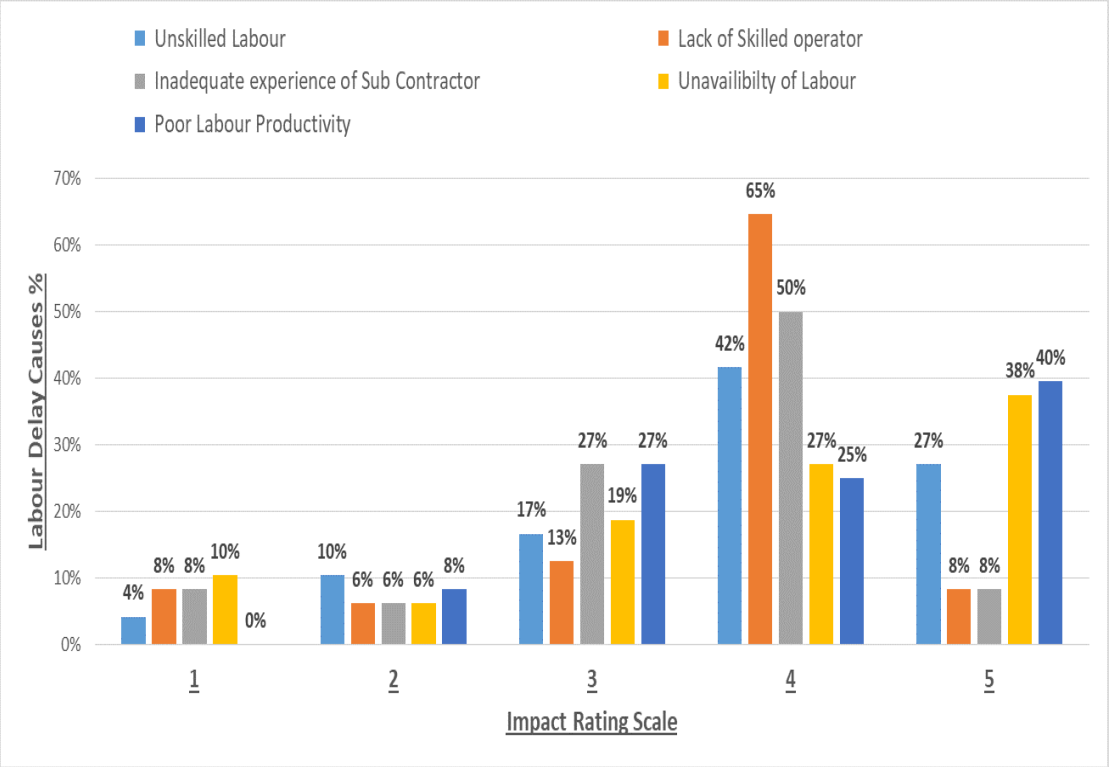


FIGURE 4.15: Rating Impact vs Causes of Delays due to Labour

Figure 4.15 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Labour observations. These participants have given their responses against the established reasons related to Labour.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 4% of probability of delays was from Unskilled Labour.

(b) A total of 8% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 8% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 10% delays were due to Delay Unavailability of Labour.

(e) And Total 01% were due to Delay Poor Labour Productivity

According to Rating Impact 2 (Low):

(a) A total 10% of probability of delays was from Unskilled Labour.

(b) A total of 6% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 6% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 6% delays were due to Delay Unavailability of Labour.

(e) And Total 8% were due to Delay Poor Labour Productivity

According to Rating Impact 3 (Medium):

(a) A total 17% of probability of delays was from Unskilled Labour.

(b) A total of 13% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 27% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 19% delays were due to Delay Unavailability of Labour.

(e) And Total 27% were due to Delay Poor Labour Productivity

According to Rating Impact 4 (High):

(a) A total 42% of probability of delays was from Unskilled Labour.

(b) A total of 65% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 50% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 27% delays were due to Delay Unavailability of Labour.

(e) And Total 25% were due to Delay Poor Labour Productivity

According to Rating Impact 5 (Very High):

(a) A total 27% of probability of delays was from Unskilled Labour.

(b) A total of 8% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 8% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 38% delays were due to Delay Unavailability of Labour.

(e) And Total 40% were due to Delay Poor Labour Productivity

### 4.4.5 Change Order Factor

This category shows all the reactions against Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification During Construction, Change in Material Prices or Price escalation and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Change Order Factor analysis be subject to Management Level v/s Change Order Factor Reasons.

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Increase in scope of

work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification during Construction, Change in Material Prices or Price escalation.

The different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Change Order Factor observations. These participants have given their responses against the established reasons related to Change Order Factor. As shown in Figure 4.16

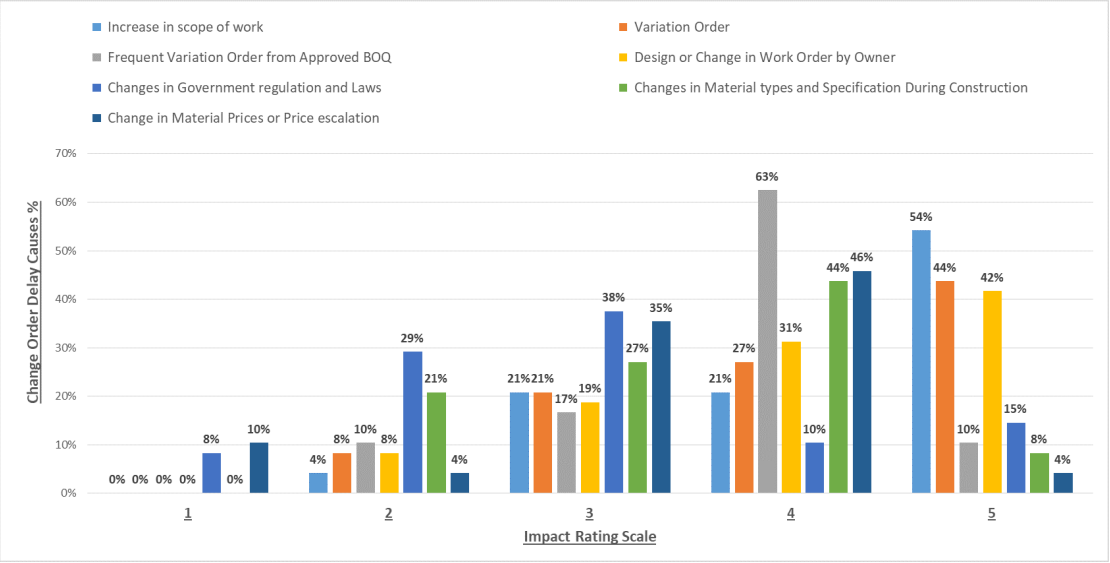


FIGURE 4.16: Rating Impact vs Causes of Delays due to Change Order Factor

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% Probability of delays was from Increase in scope of work

(b) A total of 0% delays were due to Variation Order

(c) A total 0% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 0% delays were due to Design or Change in Work Order by Owner

(e) A total 8% delays were due to Changes in Government regulation and Laws

(f) A total 0% delays were due to Changes in Material types and Specification During Construction

(g) And total 10% were due to Change in Material Prices or Price escalation

According to Rating Impact 2 (Low):

(a) A total 4% Probability of delays was from Increase in scope of work

(b) A total of 8% delays were due to Variation Order

(c) A total 10% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 8% delays were due to Design or Change in Work Order by Owner

(e) A total 29% delays were due to Changes in Government regulation and Laws

(f) A total 21% delays were due to Changes in Material types and Specification During Construction

(g) And total 4% were due to Change in Material Prices or Price escalation

According to Rating Impact 3 (Medium):

(a) A total 21% Probability of delays was from Increase in scope of work

(b) A total of 21% delays were due to Variation Order

(c) A total 17% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 19% delays were due to Design or Change in Work Order by Owner

(e) A total 38% delays were due to Changes in Government regulation and Laws

(f) A total 27% delays were due to Changes in Material types and Specification During Construction

(g) And total 35% were due to Change in Material Prices or Price escalation

According to Rating Impact 4 (High):

(a) A total 21% Probability of delays was from Increase in scope of work

(b) A total of 27% delays were due to Variation Order

(c) A total 63% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 31% delays were due to Design or Change in Work Order by Owner

(e) A total 10% delays were due to Changes in Government regulation and Laws

(f) A total 44% delays were due to Changes in Material types and Specification During Construction

(g) And total 46% were due to Change in Material Prices or Price escalation

According to Rating Impact 5 (Very High):

(a) A total 54% Probability of delays was from Increase in scope of work

(b) A total of 44% delays were due to Variation Order

(c) A total 10% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 42% delays were due to Design or Change in Work Order by Owner

(e) A total 15% delays were due to Changes in Government regulation and Laws

(f) A total 8% delays were due to Changes in Material types and Specification During Construction

(g) And total 4% were due to Change in Material Prices or Price escalation

### 4.4.6 Finance Condition

This category shows all the reactions against delays Due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Finance Condition analysis be subject to Management Level v/s Finance Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items.

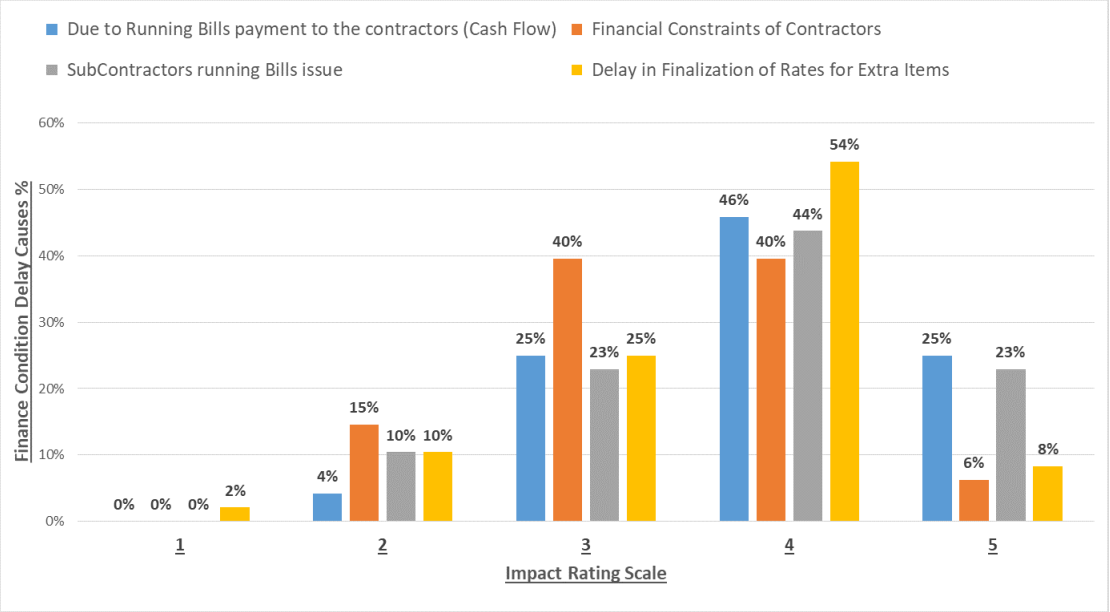


FIGURE 4.17: Rating Impact vs Causes of Delays due to Finance Condition

Figure 4.17 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Finance Condition observations. These participants have given their responses against the established reasons related to Finance Condition.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 0% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

(d) And Total 2% were due to Finalization of Rates for Extra Items.

According to Rating Impact 2 (Low):

(a) A total 4% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 15% were due to Financial Constraints of Contractors

(c) A total 10% were due to Subcontractors running Bills issue.

(d) And Total 10% were due to Finalization of Rates for Extra Items.

According to Rating Impact 3 (Medium):

(a) A total 25% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 40% were due to Financial Constraints of Contractors

(c) A total 23% were due to Subcontractors running Bills issue.

(d) And Total 25% were due to Finalization of Rates for Extra Items.

According to Rating Impact 4 (High):

(a) A total 46% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 40% were due to Financial Constraints of Contractors

(c) A total 44% were due to Subcontractors running Bills issue.

(d) And Total 54% were due to Finalization of Rates for Extra Items.

According to Rating Impact 5 (Very High):

(a) A total 25% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 6% were due to Financial Constraints of Contractors

(c) A total 23% were due to Subcontractors running Bills issue.

(d) And Total 8% were due to Finalization of Rates for Extra Items

### 4.4.7 Weather/Environment Related

This category shows all the reactions against Unforeseen Weather condition, Flood, Snow , Extreme Hot Weather Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Weather/Environment Related analysis be subject to Management Level v/s Weather/Environment Related Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unforeseen Weather condition, Flood, Snow and Extreme Hot Weather Condition.

Figure 4.18 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Weather/Environment Related observations. These participants have given their responses against the established reasons related to Weather/Environment.

Senior Level: The Senior level managers had the following observations:

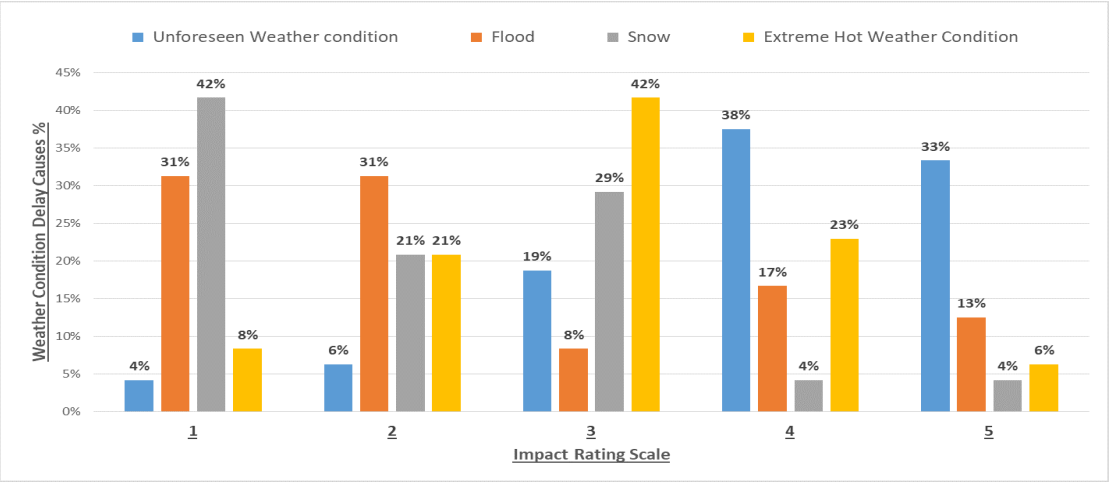


FIGURE 4.18: Rating Impact vs Causes of Delays due to Weather/Environment

According to Rating Impact 1 (Very Low):

(a) An Unforeseen Weather condition has total 4% probability to cause the delay.

(b) A Flood has total of 31% of probability.

(c) A Snow has 42% due to.

(d) And Total 8% due to Extreme Hot Weather Condition.

According to Rating Impact 2 (Low):

(a) An Unforeseen Weather condition has total 6% probability to cause the delay.

(b) A Flood has total of 31% of probability.

(c) A Snow has 21% due to.

(d) And Total 21% due to Extreme Hot Weather Condition.

According to Rating Impact 3 (Medium):

(a) An Unforeseen Weather condition has total 19% probability to cause the delay.

(b) A Flood has total of 8% of probability.

(c) A Snow has 29% due to.

(d) And Total 42% due to Extreme Hot Weather Condition.

According to Rating Impact 4 (High):

(a) An Unforeseen Weather condition has total 38% probability to cause the delay.

(b) A Flood has total of 17% of probability.

(c) A Snow has 4% due to.

(d) And Total 23% due to Extreme Hot Weather Condition.

According to Rating Impact 5 (Very High):

(a) An Unforeseen Weather condition has total 33% probability to cause the delay.

(b) A Flood has total of 13% of probability.

(c) A Snow has 4% due to.

(d) And Total 6% due to Extreme Hot Weather Condition.

### 4.4.8 Site Condition

This category shows all the reactions against Due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Site Condition analysis be subject to Management Level v/s Site Condition Reasons.

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition.

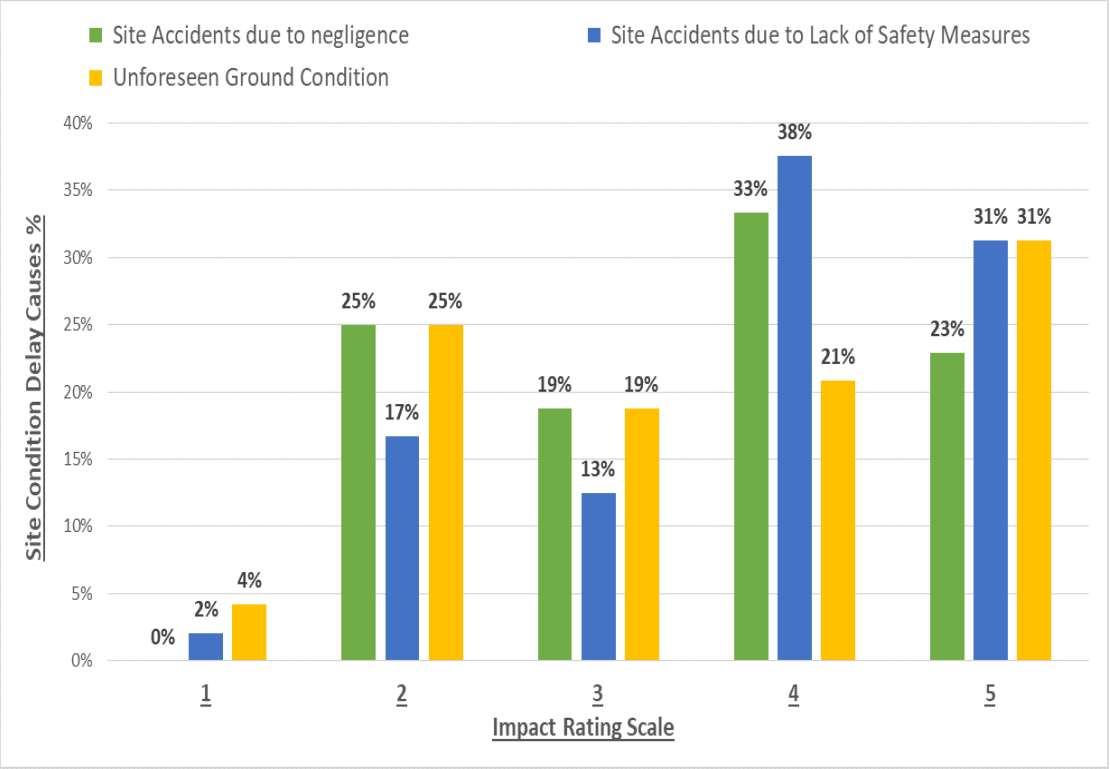


FIGURE 4.19: Rating Impact vs Causes of Delays due to Site Condition

Figure 4.19 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Site Condition observations. These participants have given their responses against the established reasons related to Site Condition.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 2% were due to Restricted Access at site.

(c) A total 4% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 25% delays were Due to Possession Issue.

(b) A total of 17% were due to Restricted Access at site.

(c) A total 25% were due to Prohibited Area.

According to Rating Impact 3 (Medium):

(a) A total 19% delays were Due to Possession Issue.

(b) A total of 13% were due to Restricted Access at site.

(c) A total 19% were due to Prohibited Area.

According to Rating Impact 4 (High):

(a) A total 33% delays were Due to Possession Issue.

(b) A total of 38% were due to Restricted Access at site.

(c) A total 21% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 23% delays were Due to Possession Issue.

(b) A total of 31% were due to Restricted Access at site.

(c) A total 31% were due to Prohibited Area

### 4.4.9 Land Issues

This category shows all the reactions against Due to Possession Issue, Restricted Access at site. Prohibited Area and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Land Issues analysis be subject to Management Level v/s Land Issues Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Possession Issue, Restricted Access at site and Prohibited Area.

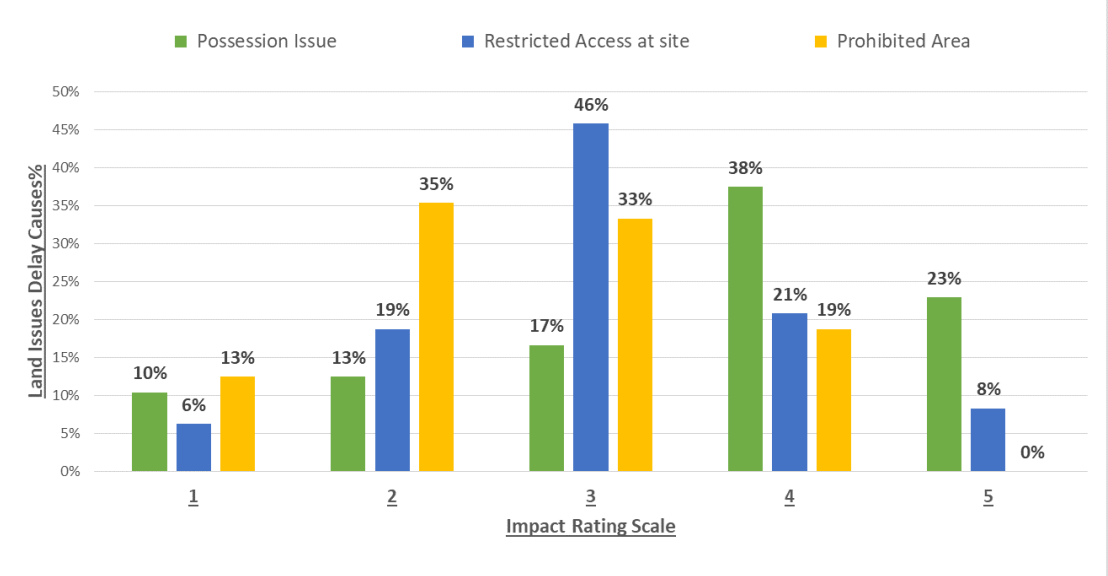


FIGURE 4.20: Rating Impact vs Causes of Delays due to Land Issues

Figure 4.20 shows the different Experience level of respondents (1-60 Highest Years of Experienced Members) as per senior level members Vs Land Issues Related observations. These participants have given their responses against the established reasons related to Land Issues.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 10% delays were Due to Possession Issue.

(b) A total of 6% were due to Restricted Access at site.

(c) A total 13% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 13% delays were Due to Possession Issue.

(b) A total of 19% were due to Restricted Access at site.

(c) A total 35% were due to Prohibited Area.

According to Rating Impact 3 (Medium):

(a) A total 17% delays were Due to Possession Issue.

(b) A total of 46% were due to Restricted Access at site.

(c) A total 33% were due to Prohibited Area.

According to Rating Impact 4 (High):

(a) A total 38% delays were Due to Possession Issue.

(b) A total of 21% were due to Restricted Access at site.

(c) A total 19% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 23% delays were Due to Possession Issue.

(b) A total of 8% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area..

### 4.4.10 Approval Issues With Client

This category shows all the reactions against Due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Approval Issues with Client analysis be subject to Management Level v/s Approval Issues with Client Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills.

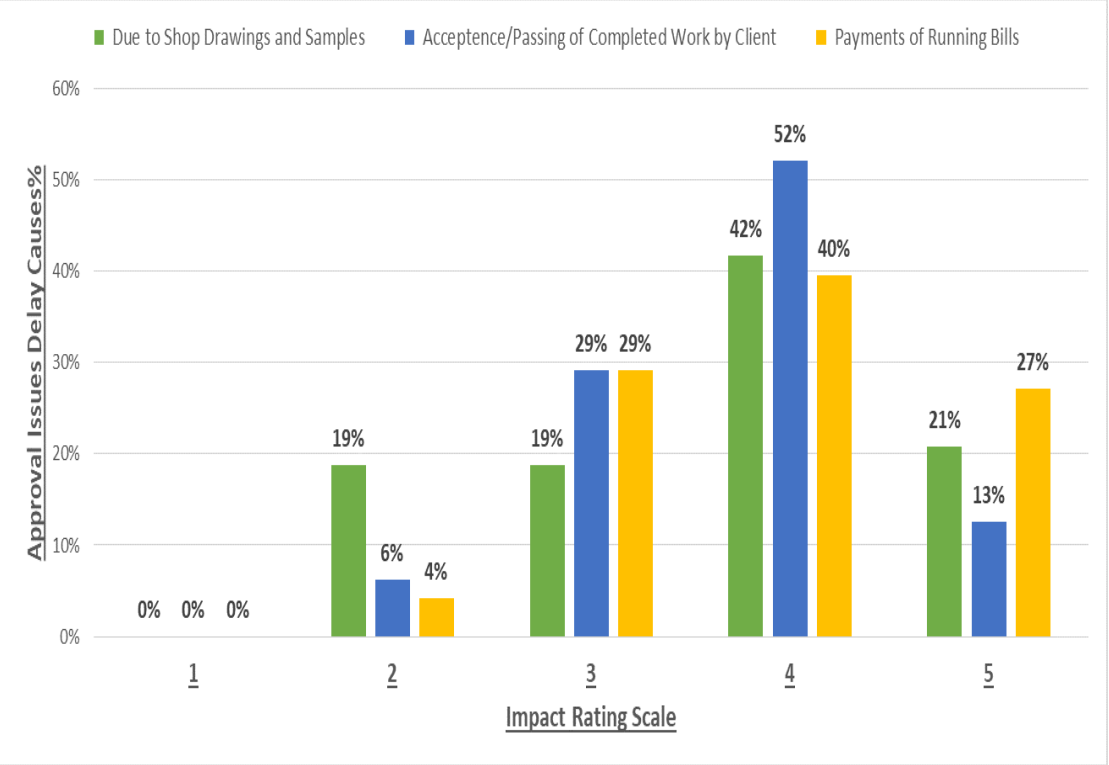


FIGURE 4.21: Rating Impact vs Causes of Delays due to Approval Issues with Client

Figure 4.21 shows the different Experience level of respondent (1-60 Highest Years of Experienced Members) as per Senior level members Vs Approval Issues with

Client observations. These participants have given their responses against the established reasons related to Approval Issues with Client.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Shop Drawings and Samples has total 0% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 0% chance

(c) Payments of Running Bills 0%.

According to Rating Impact 2 (Low):

(a) Delays due to Shop Drawings and Samples has total 19% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 6% chance

(c) Payments of Running Bills 4%.

According to Rating Impact 3 (Medium):

(a) Delays due to Shop Drawings and Samples has total 19% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 29% chance

(c) Payments of Running Bills 29%.

According to Rating Impact 4 (High):

(a) Delays due to Shop Drawings and Samples has total 42% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 52% chance

(c) Payments of Running Bills 40%.

According to Rating Impact 5 (Very High):

(a) Delays due to Shop Drawings and Samples has total 21% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 13% chance

(c) Payments of Running Bills 27%.

### 4.4.11 Management Decision Making Within Organization

This category shows all the reactions against Due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Coordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner and other Specified delay which is able validate or indicate the participant as per his encounter or extend scope.

Management Decision Making within Your Organization analysis be subject to Management Level v/s Management Decision Making within Your Organization Reasons

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Coordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner.

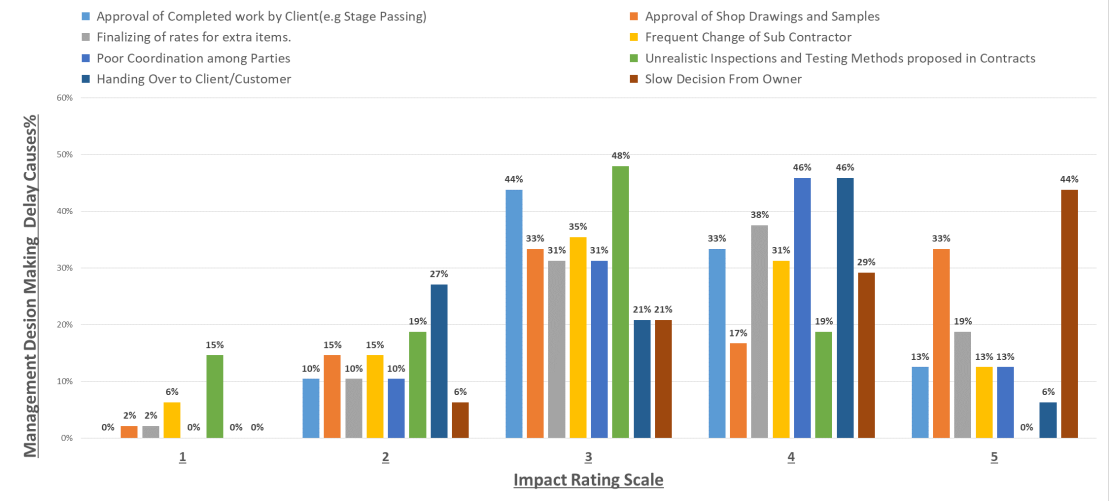


FIGURE 4.22: Rating Impact vs Causes of Delays due to Management Decision Making within Organization

The Different Experience level of respondents (1-60 Highest Years of Experienced Members) as per Senior level members Vs Reasons of Management Decision Making within Your Organization observations. These participants have given their responses against the established reasons related to Management Decision Making within Organization. As shown in Figure 4.22.

Senior Level: The Senior level managers had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 2% of total probability.

(c) Finalizing of rates for extra items also has 2% chance to delay cause.

(d) Frequent Change of Sub Contractor has 6%.

(e) Poor Coordination among Parties has 0% chance.

(f) A total 15% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 0% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 0% probability of occurrence.

According to Rating Impact 2 (Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 10% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 15% of total probability.

(c) Finalizing of rates for extra items also has 10% chance to delay cause.

(d) Frequent Change of Sub Contractor has 15%.

(e) Poor Coordination among Parties has 10% chance.

(f) A total 19% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 27% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 6% probability of occurrence.

According to Rating Impact 3 (Medium):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 44% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 33% of total probability.

(c) Finalizing of rates for extra items also has 31% chance to delay cause.

(d) Frequent Change of Sub Contractor has 35%.

(e) Poor Coordination among Parties has 31% chance.

(f) A total 48% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 21% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 21% probability of occurrence.

According to Rating Impact 4 (High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 33% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 17% of total probability.

(c) Finalizing of rates for extra items also has 38% chance to delay cause.

(d) Frequent Change of Sub Contractor has 31%.

(e) Poor Coordination among Parties has 46% chance.

(f) A total 19% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 46% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 31% probability of occurrence.

According to Rating Impact 5 (Very High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 13% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 33% of total probability.

(c) Finalizing of rates for extra items also has 19% chance to delay cause.

(d) Frequent Change of Sub Contractor has 13%.

(e) Poor Coordination among Parties has 13% chance.

(f) A total 0% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 6% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 44% probability of occurrence.

Different level of respondent has assessed the typical probabilities of occurrence of each delay reason. They concluded that each reason of delay has different magnitude to cause to affect the project performance as per senior level participants.

## 4.5 Intermediate Level vs Delay Causes

### 4.5.1 Equipment

This category shows all the reactions against Shortage of Equipment, Unavailability of Efficient Equipment and Inefficient Use of Equipment. Equipment analysis be subjected to Position Member v/s Equipment Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Equipment, Unavailability of Efficient Equipment, Inefficient Use of Equipment and Procurement of Equipment.

Figure 4.23 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Equipment observations. These participants have given their responses against the established reasons related to equipment.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

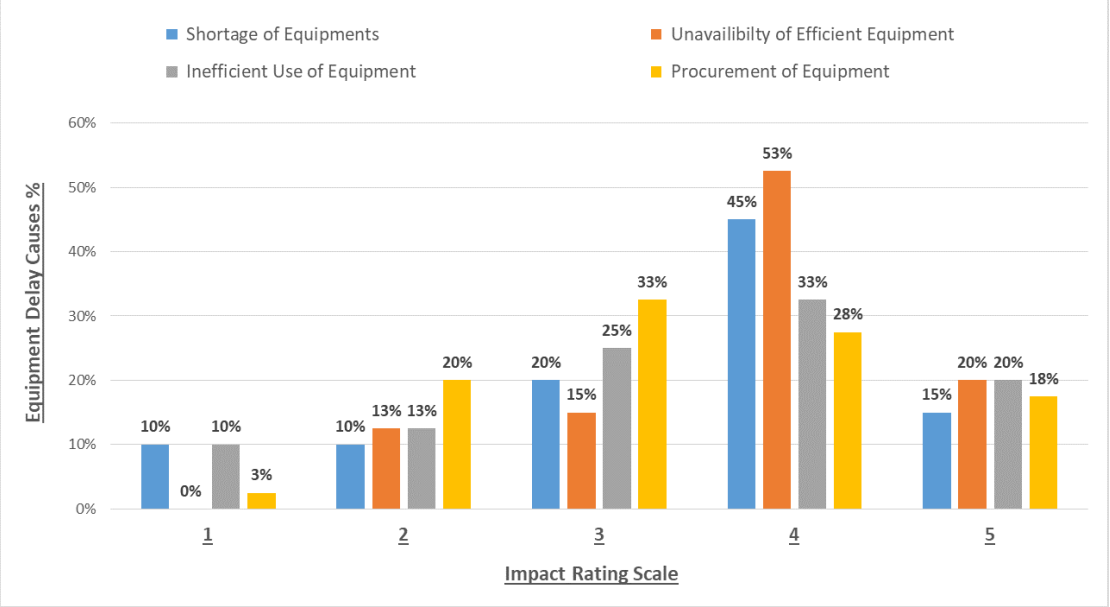


FIGURE 4.23: Rating Impact vs Causes of Delays due to Equipment

According to Rating Impact 1 (Very Low):

(a) A shortage of Equipment has 10% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 0%

(c) Inefficient Use of Equipment has 10%

(d) And Procurement of Equipment has 3% magnitude.

According to Rating Impact 2 (Low):

(a) A shortage of Equipment has 10% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 13%

(c) Inefficient Use of Equipment has 13%

(d) And Procurement of Equipment has 20% magnitude.

According to Rating Impact 3 (Medium):

(a) A shortage of Equipment has 20% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 15%

(c) Inefficient Use of Equipment has 25%

(d) And Procurement of Equipment has 33% magnitude.

According to Rating Impact 4 (High):

(a) A shortage of Equipment has 45% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 53%

(c) Inefficient Use of Equipment has 33%

(d) And Procurement of Equipment has 28 magnitude

According to Rating Impact 5 (Very High):

(a) A shortage of Equipment has 15% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 20%

(c) Inefficient Use of Equipment has 20%

(d) And Procurement of Equipment has 18% magnitude

### 4.5.2 Material

This category shows all the reactions against Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner, Delay in Material Procurement by Contractor. Material analysis be subject to Management Level v/s Material Reasons:

In this category of delays, to understand that how outcomes of responses were established by from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Material,

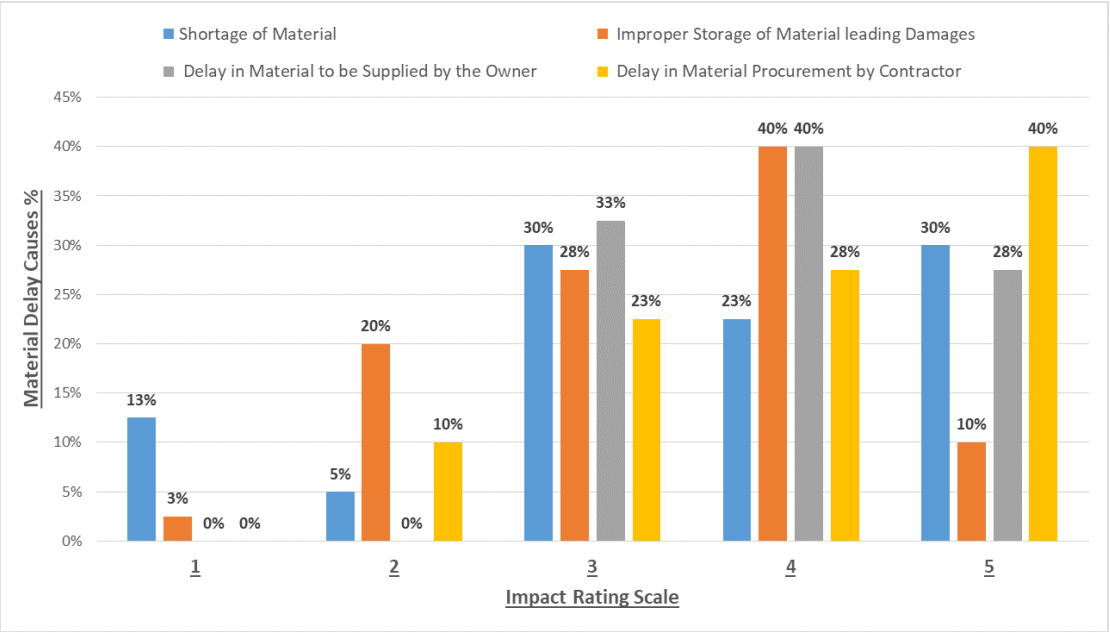


FIGURE 4.24: Rating Impact vs Causes of Delays due to Material Reasons

Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner and Delay in Material Procurement by Contractor.

Figure 4.24 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Material observations. These participants have given their responses against the established reasons related to material.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A shortage of Material has 13% probability of occurrence

(b) Similarly, a total 3% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 0%.

According to Rating Impact 2 (Low):

(a) A shortage of Material has 5% probability of occurrence

(b) Similarly, a total 20% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 10%.

According to Rating Impact 3 (Medium):

(a) A shortage of Material has 30% probability of occurrence

(b) Similarly, a total 28% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 33%

(d) And Material Procurement by Contractor has 23%.

According to Rating Impact 4 (High):

(a) A shortage of Material has 67% probability of occurrence

(b) Similarly, a total 44% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 22%

(d) And Material Procurement by Contractor has 44%.

According to Rating Impact 5 (Very High):

(a) A shortage of Material has 30% probability of occurrence

(b) Similarly, a total 10% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 28%

(d) And Material Procurement by Contractor has 40%

### 4.5.3 Management

This category shows all the reactions against Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time. Management analysis be subject to Management Level v/s Management Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Management observations. These participants have given their responses against the established reasons related to Management. As shown in Figure 4.25.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) An Issuance of LOA has 8% of probability to delay cause.

(b) A total of 5% due to Issues of Planning & Scheduling

(c) A total 5% due to Unqualified Work Staff.

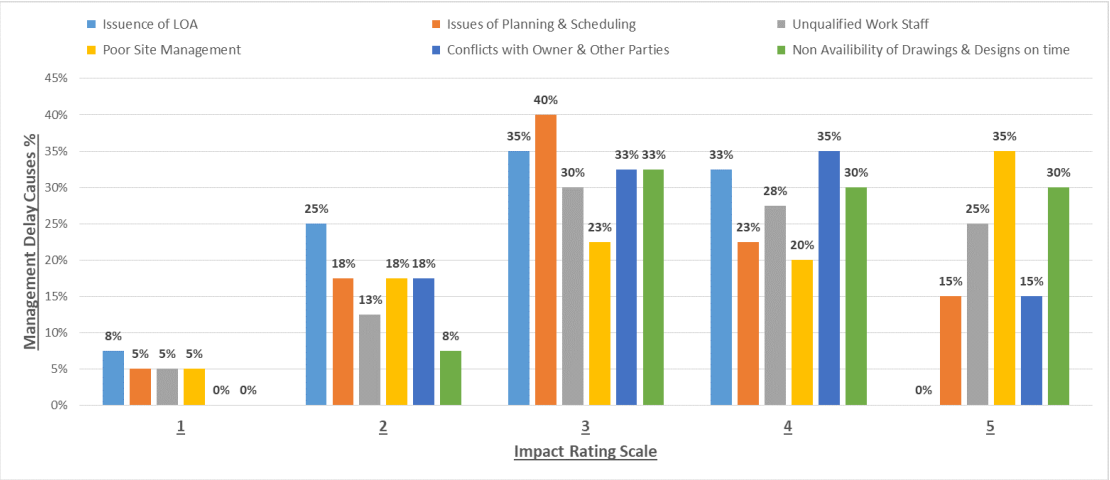


FIGURE 4.25: Rating Impact vs Causes of Delays due to Management

(d) A total 5% due to Poor Site Management.

(e) A total 0% due to Conflicts with Owner and Other Parties.

(f) A total 0% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 2 (Low):

(a) An Issuance of LOA has 25% of probability to delay cause.

(b) A total of 81% due to Issues of Planning & Scheduling

(c) A total 13% due to Unqualified Work Staff.

(d) A total 18% due to Poor Site Management.

(e) A total 18% due to Conflicts with Owner and Other Parties.

(f) A total 8% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 3 (Medium):

(a) An Issuance of LOA has 35% of probability to delay cause.

(b) A total of 40% due to Issues of Planning & Scheduling

(c) A total 30% due to Unqualified Work Staff.

(d) A total 23% due to Poor Site Management.

(e) A total 33% due to Conflicts with Owner and Other Parties.

(f) A total 33% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 4 (High):

(a) An Issuance of LOA has 33% of probability to delay cause.

(b) A total of 23% due to Issues of Planning & Scheduling

(c) A total 28% due to Unqualified Work Staff.

(d) A total 20% due to Poor Site Management.

(e) A total 35% due to Conflicts with Owner and Other Parties.

(f) A total 30% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 5 (Very High):

(a) An Issuance of LOA has 0% of probability to delay cause.

(b) A total of 15% due to Issues of Planning & Scheduling

(c) A total 25% due to Unqualified Work Staff.

(d) A total 35% due to Poor Site Management.

(e) A total 15% due to Conflicts with Owner and Other Parties.

(f) A total 30% probability of delays due to Non Availability of Drawings & Designs on time

### 4.5.4 Labour

This category shows all the reactions against Unskilled Labour, Lack of Skilled operator, Inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity delay which were indicated from the participant as per his encounter or extend scope. Labour analysis be subject to Management Level v/s Labour Reasons:

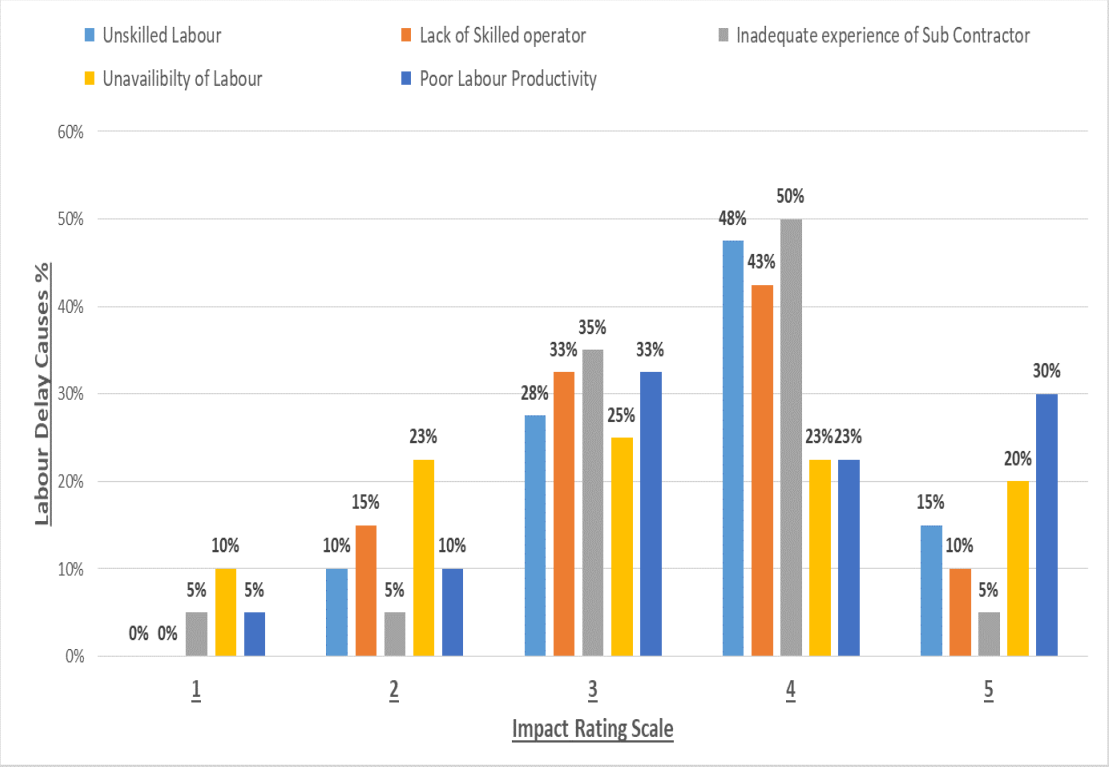


FIGURE 4.26: Rating Impact vs Causes of Delays due to Labour

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unskilled Labour, Lack of Skilled operator, inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Labour observations. These participants have given their responses against the established reasons related to Labour. As shown in Figure 4.26.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% of probability of delays was from Unskilled Labour.

(b) A total of 0% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 5% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 10% delays were due to Delay Unavailability of Labour.

(e) And Total 5% were due to Delay Poor Labour Productivity

According to Rating Impact 2 (Low):

(a) A total 10% of probability of delays was from Unskilled Labour.

(b) A total of 15% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 5% delays were due to Delay in inadequate experience of Sub Contractor.

According to Rating Impact 3 (Medium):

(a) A total 28% of probability of delays was from Unskilled Labour.

(b) A total of 33% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 35% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 25% delays were due to Delay Unavailability of Labour.

(e) And Total 33% were due to Delay Poor Labour Productivity

According to Rating Impact 4 (High):

(a) A total 48% of probability of delays was from Unskilled Labour.

(b) A total of 43% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 50% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 23% delays were due to Delay Unavailability of Labour.

(e) And Total 23% were due to Delay Poor Labour Productivity

According to Rating Impact 5 (Very High):

(a) A total 15% of probability of delays was from Unskilled Labour.

(b) A total of 10% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 5% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 20% delays were due to Delay Unavailability of Labour.

(e) And Total 30% were due to Delay Poor Labour Productivity

### 4.5.5 Change Order Factor

This category shows all the reactions against Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification During Construction, Change in Material Prices or

Price escalation and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Change Order Factor analysis be subject to Management Level v/s Change Order Factor Reasons.

In this category of delays, to understand that how outcomes of responses were established from participant.

This category analysis shows the total magnitude of reasons against positions members for delays causes due to Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification during Construction, Change in Material Prices or Price escalation.

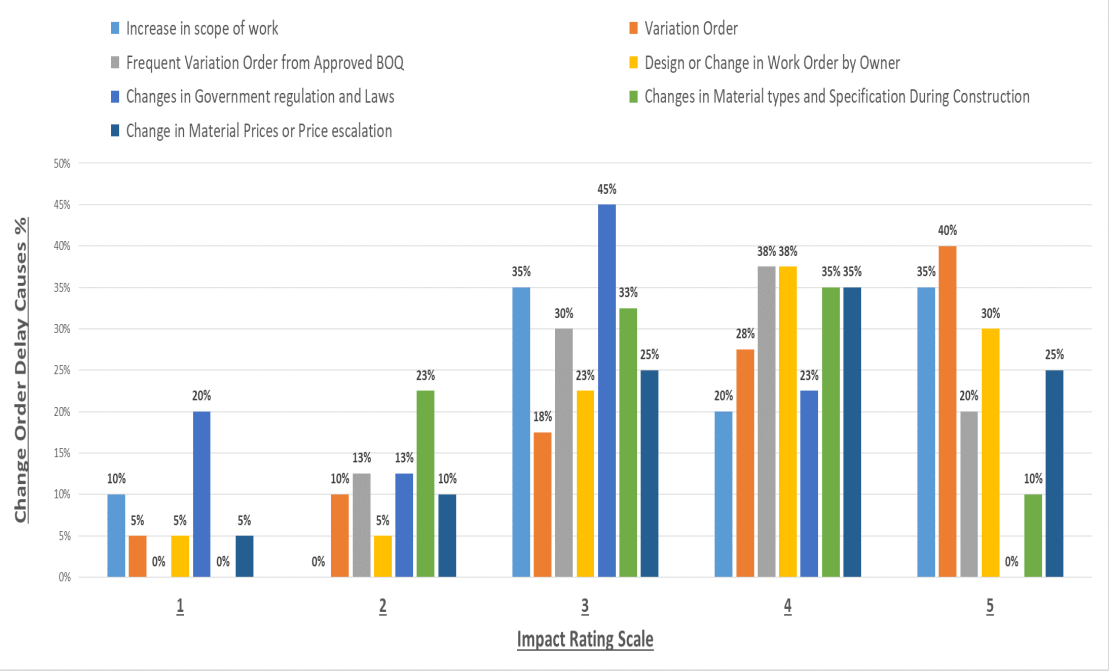


FIGURE 4.27: Rating Impact vs Causes of Delays due to Change Order Factor

Figure 4.27 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Change Order Factor observations. These participants have given their responses against the established reasons related to Change Order Factor.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 10% Probability of delays was from Increase in scope of work

(b) A total of 5% delays were due to Variation Order

(c) A total 0% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 5% delays were due to Design or Change in Work Order by Owner

(e) A total 20% delays were due to Changes in Government regulation and Laws

(f) A total 0% delays were due to Changes in Material types and Specification During Construction

According to Rating Impact 2 (Low):

(a) A total 0% Probability of delays was from Increase in scope of work

(b) A total of 10% delays were due to Variation Order

(c) A total 13% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 5% delays were due to Design or Change in Work Order by Owner

(e) A total 13% delays were due to Changes in Government regulation and Laws

(f) A total 23% delays were due to Changes in Material types and Specification During Construction

(g) And total 10% were due to Change in Material Prices or Price escalation

According to Rating Impact 3 (Medium):

(a) A total 35% Probability of delays was from Increase in scope of work

(b) A total of 18% delays were due to Variation Order

(c) A total 30% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 23% delays were due to Design or Change in Work Order by Owner

(e) A total 45% delays were due to Changes in Government regulation and Laws

(f) A total 33% delays were due to Changes in Material types and Specification During Construction

(g) And total 25% were due to Change in Material Prices or Price escalation

According to Rating Impact 4 (High):

(a) A total 20% Probability of delays was from Increase in scope of work

(b) A total of 28% delays were due to Variation Order

(c) A total 38% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 38% delays were due to Design or Change in Work Order by Owner

(e) A total 23% delays were due to Changes in Government regulation and Laws

(f) A total 35% delays were due to Changes in Material types and Specification During Construction

(g) And total 35% were due to Change in Material Prices or Price escalation

According to Rating Impact 5 (Very High):

(a) A total 35% Probability of delays was from Increase in scope of work

(b) A total of 40% delays were due to Variation Order

(c) A total 20% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 30% delays were due to Design or Change in Work Order by Owner

(e) A total 0% delays were due to Changes in Government regulation and Laws

(f) A total 10% delays were due to Changes in Material types and Specification During Construction

(g) And total 25% were due to Change in Material Prices or Price escalation

### 4.5.6 Finance Condition

This category shows all the reactions against delays Due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Finance Condition analysis be subject to Management Level v/s Finance Condition Reasons:

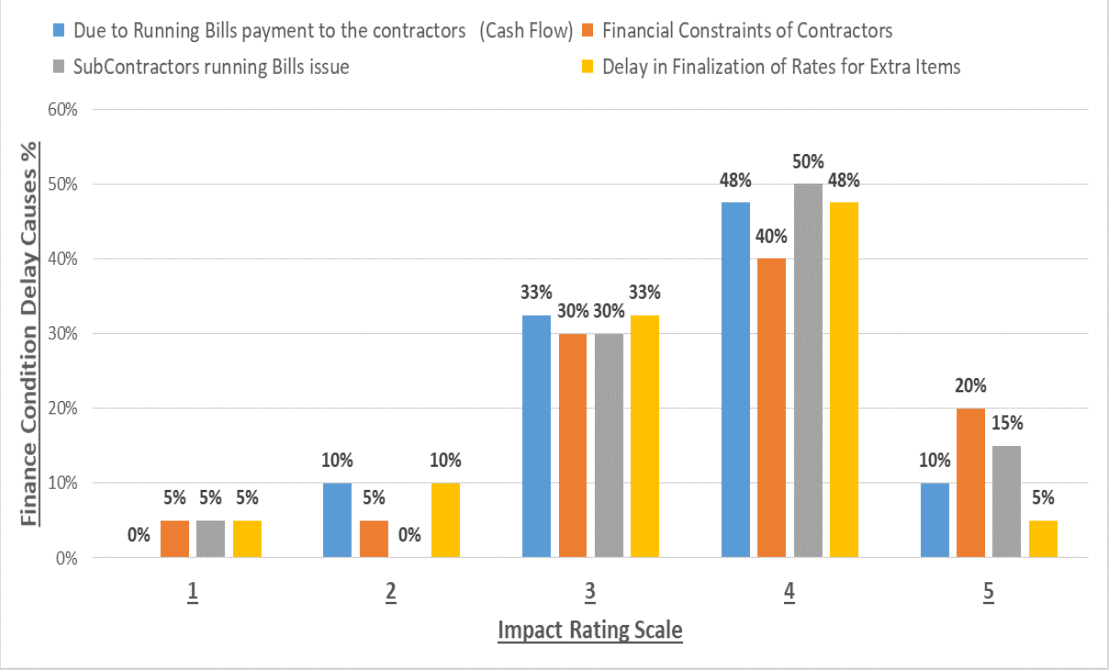


FIGURE 4.28: Rating Impact vs Causes of Delays due to Finance Condition

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items.

Figure 4.28 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Finance Condition observations. These participants have given their responses against the established reasons related to Finance Condition.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 5% were due to Financial Constraints of Contractors

(c) A total 5% were due to Subcontractors running Bills issue.

According to Rating Impact 2 (Low):

(a) A total 10% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 5% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

According to Rating Impact 3 (Medium):

(a) A total 33% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 30% were due to Financial Constraints of Contractors

(c) A total 30% were due to Subcontractors running Bills issue.

(d) And Total 33% were due to Finalization of Rates for Extra Items.

According to Rating Impact 4 (High):

(a) A total 48% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 40% were due to Financial Constraints of Contractors

(c) A total 50% were due to Subcontractors running Bills issue.

(d) And Total 48% were due to Finalization of Rates for Extra Items.

According to Rating Impact 5 (Very High):

(a) A total 10% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 20% were due to Financial Constraints of Contractors

(c) A total 15% were due to Subcontractors running Bills issue.

(d) And Total 5% were due to Finalization of Rates for Extra Items

### 4.5.7 Weather/Environment Related

This category shows all the reactions against Unforeseen Weather condition, Flood, Snow , Extreme Hot Weather Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Weather/Environment Related analysis be subject to Management Level v/s Weather/Environment Related Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unforeseen Weather condition, Flood, Snow and Extreme Hot Weather Condition.

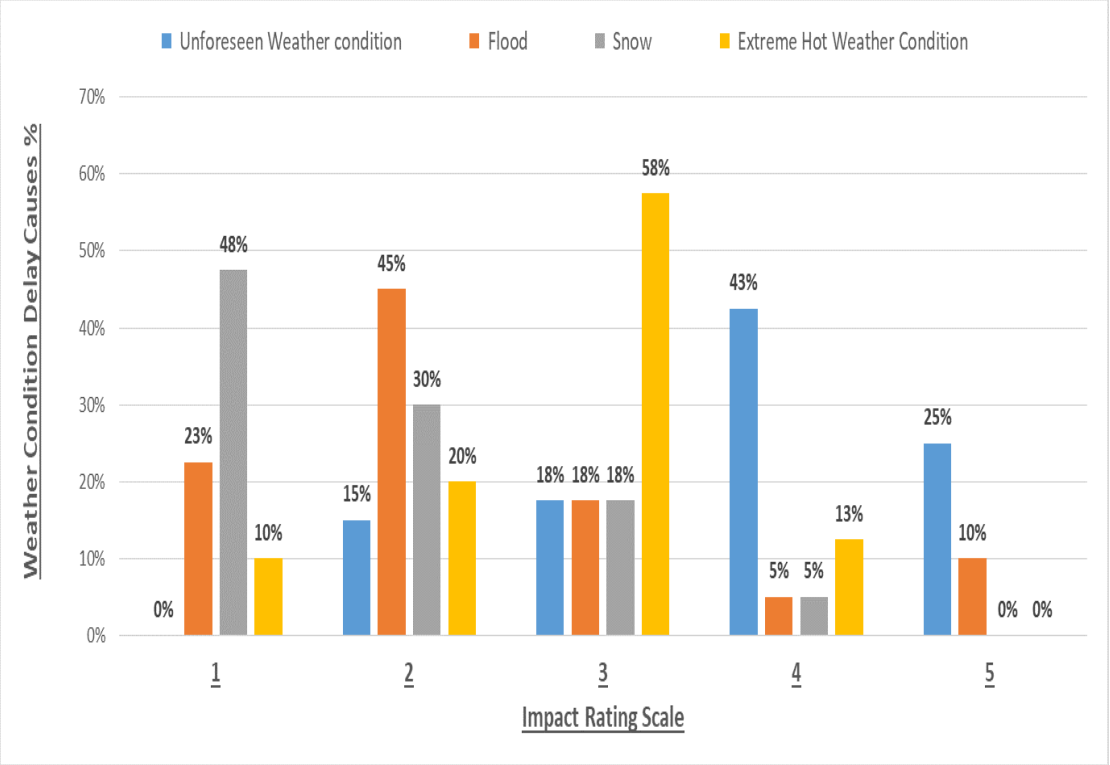


FIGURE 4.29: Rating Impact vs Causes of Delays due to Weather/Environment Related

Figure 4.29 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Weather/Environment Related observations. These participants have given their responses against the established reasons related to Weather/Environment.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) An Unforeseen Weather condition has total 0% probability to cause the delay.

(b) A Flood has total of 23% of probability.

(c) A Snow has 48% due to.

(d) And Total 10% due to Extreme Hot Weather Condition.

According to Rating Impact 2 (Low):

(a) An Unforeseen Weather condition has total 15% probability to cause the delay.

(b) A Flood has total of 45% of probability.

(c) A Snow has 30% due to.

(d) And Total 20% due to Extreme Hot Weather Condition.

According to Rating Impact 3 (Medium):

(a) An Unforeseen Weather condition has total 18% probability to cause the delay.

(b) A Flood has total of 18% of probability.

(c) A Snow has 18% due to.

(d) And Total 58% due to Extreme Hot Weather Condition.

According to Rating Impact 4 (High):

(a) An Unforeseen Weather condition has total 43% probability to cause the delay.

(b) A Flood has total of 5% of probability.

(c) A Snow has 5% due to.

(d) And Total 13% due to Extreme Hot Weather Condition.

According to Rating Impact 5 (Very High):

(a) An Unforeseen Weather condition has total 25% probability to cause the delay.

(b) A Flood has total of 10% of probability.

(c) A Snow has 0% due to.

(d) And Total 0% due to Extreme Hot Weather Condition.

### 4.5.8 Site Condition

This category shows all the reactions against Due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Site Condition analysis be subject to Management Level v/s Site Condition Reasons:

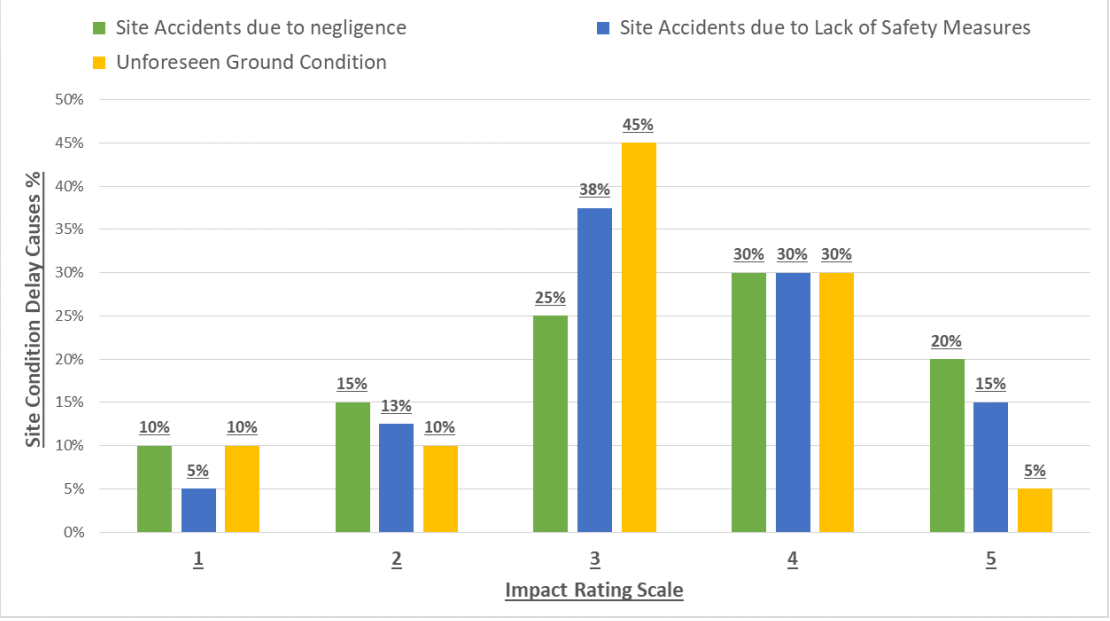


FIGURE 4.30: Rating Impact vs Causes of Delays due to Site Condition

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude

of reasons against positions members for delays causes due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Site Condition observations. These participants have given their responses against the established reasons related to Site Condition. As shown in Figure 4.30

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 10% delays were Due to Possession Issue.

(b) A total of 5% were due to Restricted Access at site.

(c) A total 10% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 15% delays were Due to Possession Issue.

(b) A total of 13% were due to Restricted Access at site.

According to Rating Impact 3 (Medium):

(a) A total 25% delays were Due to Possession Issue.

(b) A total of 38% were due to Restricted Access at site.

According to Rating Impact 4 (High):

(a) A total 30% delays were Due to Possession Issue.

(b) A total of 30% were due to Restricted Access at site.

(c) A total 30% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 20% delays were Due to Possession Issue.

(b) A total of 15% were due to Restricted Access at site.

(c) A total 5% were due to Prohibited Area.

### 4.5.9 Land Issues

This category shows all the reactions against Due to Possession Issue, Restricted Access at site. Prohibited Area and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Land Issues analysis be subject to Management Level v/s Land Issues Reasons:

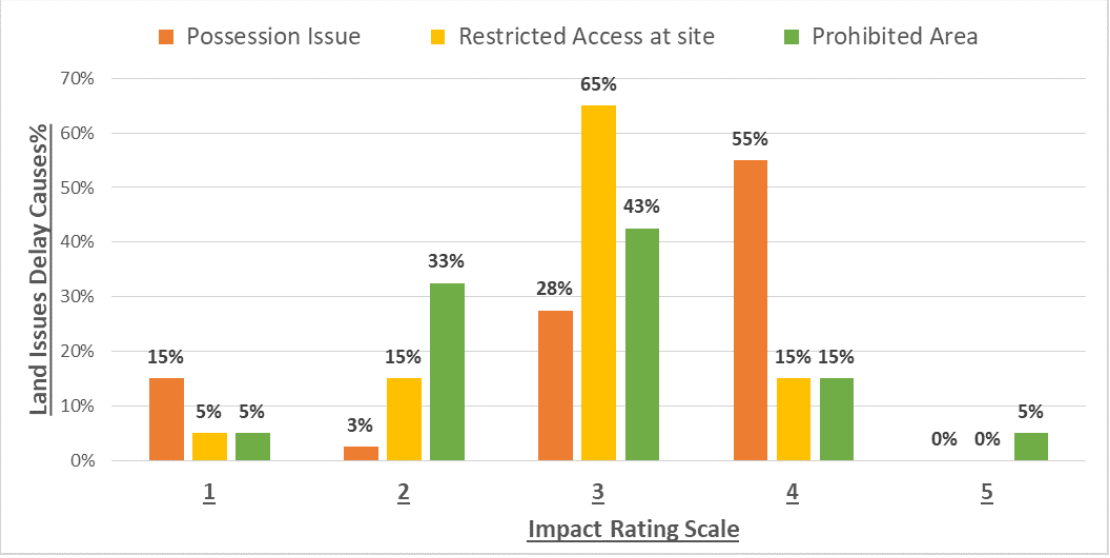


FIGURE 4.31: Rating Impact vs Causes of Delays due to Land Issues

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude

of reasons against positions members for delays causes due to Possession Issue, Restricted Access at site and Prohibited Area.

Figure 4.31 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Land Issues Related observations. These participants have given their responses against the established reasons related to Land Issues.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 15% delays were Due to Possession Issue.

(b) A total of 5% were due to Restricted Access at site.

(c) A total 5% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 3% delays were Due to Possession Issue.

(b) A total of 15% were due to Restricted Access at site.

According to Rating Impact 3 (Medium):

(a) A total 28% delays were Due to Possession Issue.

(b) A total of 65% were due to Restricted Access at site.

According to Rating Impact 4 (High):

(a) A total 55% delays were Due to Possession Issue.

(b) A total of 15% were due to Restricted Access at site.

(c) A total 15% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 0% were due to Restricted Access at site.

(c) A total 5% were due to Prohibited Area.

### 4.5.10 Approval Issues With Client

This category shows all the reactions against Due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Approval Issues with Client analysis be subject to Management Level v/s Approval Issues with Client Reasons:

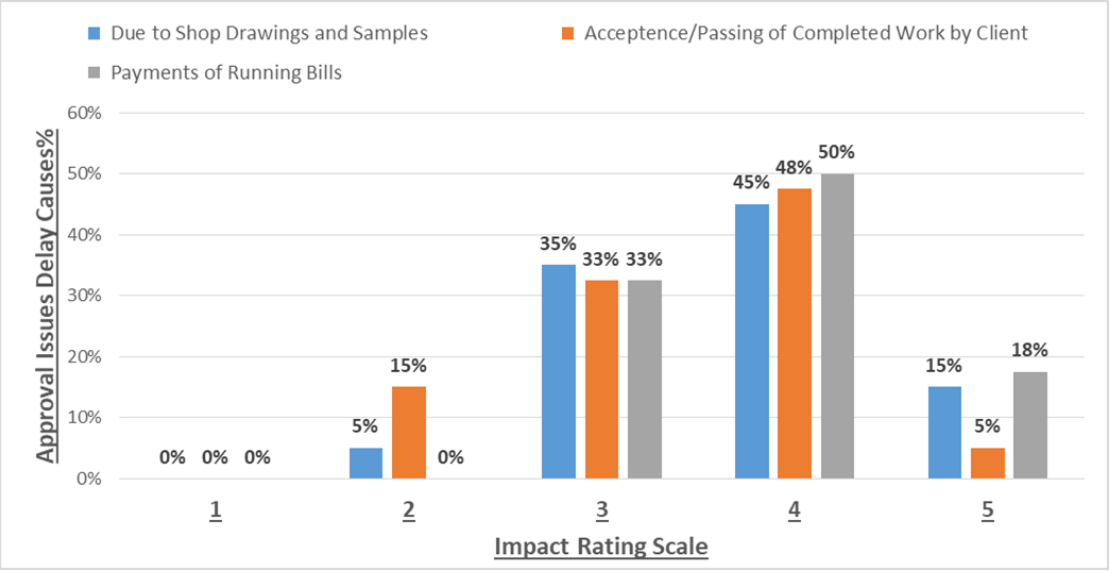


FIGURE 4.32: Rating Impact vs Causes of Delays due to

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Shop Drawings and

Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills.

Approval Issues with Client

Figure 4.32 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Approval Issues with Client observations. These participants have given their responses against the established reasons related to Approval Issues with Client.

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Shop Drawings and Samples has total 0% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 0% chance

(c) Payments of Running Bills 0%.

According to Rating Impact 2 (Low):

(a) Delays due to Shop Drawings and Samples has total 5% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 15% chance

(c) Payments of Running Bills 0%.

According to Rating Impact 3 (Medium):

(a) Delays due to Shop Drawings and Samples has total 35% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 33% chance

(c) Payments of Running Bills 33%.

According to Rating Impact 4 (High):

(a) Delays due to Shop Drawings and Samples has total 45% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 48% chance

(c) Payments of Running Bills 50%.

According to Rating Impact 5 (Very High):

(a) Delays due to Shop Drawings and Samples has total 15% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 5% chance

(c) Payments of Running Bills 18%.

### 4.5.11 Management Decision Making Within Organization

This category shows all the reactions against Due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Coordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner and other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Management Decision Making within Your Organization analysis be subject to Management Level v/s Management Decision Making within Your Organization Reasons

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of

reasons against positions members for delays causes due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Co-ordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Intermediate level members Vs Reasons of Management Decision Making within Your Organization observations. These participants have given their responses against the established reasons related to Management Decision Making within Organization.

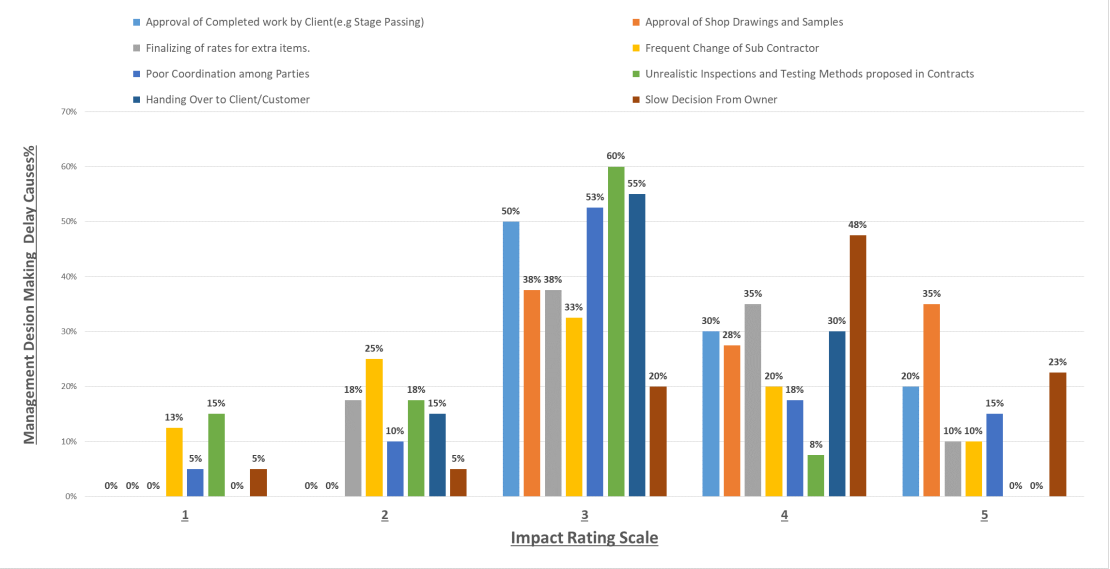


FIGURE 4.33: Rating Impact vs Causes of Delays due to Management Decision Making within Organization

Intermediate Level: The Intermediate level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 0% chance to delay cause.

(d) Frequent Change of Sub Contractor has 13%.

(e) Poor Coordination among Parties has 5% chance.

(f) A total 15% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 0% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 5% probability of occurrence.

According to Rating Impact 2 (Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 18% chance to delay cause.

(d) Frequent Change of Sub Contractor has 25%.

(e) Poor Coordination among Parties has 10% chance.

(f) A total 18% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

According to Rating Impact 3 (Medium):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 50% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 38% of total probability.

(c) Finalizing of rates for extra items also has 38% chance to delay cause.

(d) Frequent Change of Sub Contractor has 33%.

(e) Poor Coordination among Parties has 53% chance.

(f) A total 60% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 55% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 20% probability of occurrence.

According to Rating Impact 4 (High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 30% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 28% of total probability.

(c) Finalizing of rates for extra items also has 35% chance to delay cause.

(d) Frequent Change of Sub Contractor has 20%.

(e) Poor Coordination among Parties has 18% chance.

(f) A total 8% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 30% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 48% probability of occurrence.

According to Rating Impact 5 (Very High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 20% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 35% of total probability.

(c) Finalizing of rates for extra items also has 10% chance to delay cause.

(d) Frequent Change of Sub Contractor has 10%.

(e) Poor Coordination among Parties has 15% chance.

(f) A total 0% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 0% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 23% probability of occurrence.

Different level of respondent has assessed the typical probabilities of occurrence of each delay reason. They concluded that each reason of delay has different magnitude to cause to affect the project performance as per Intermediate level participants.

## 4.6 Field Level vs Delay Causes

### 4.6.1 Equipment

This category shows all the reactions against Shortage of Equipment, Unavailability of Efficient Equipment and Inefficient Use of Equipment. Equipment analysis be subjected to Position Member v/s Equipment Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Equipment, Unavailability of Efficient Equipment, Inefficient Use of Equipment and Procurement of Equipment.

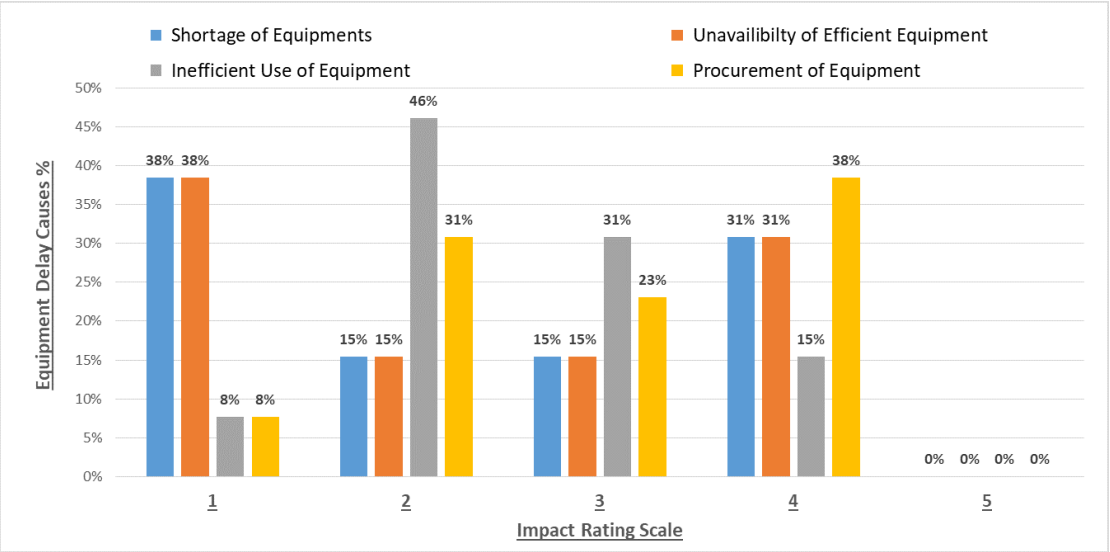


FIGURE 4.34: Rating Impact vs Causes of Delays due to Equipment

Figure 4.34 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Equipment observations. These participants have given their responses against the established reasons related to equipment.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A shortage of Equipment has 38% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 38%

(c) Inefficient Use of Equipment has 8%

(d) And Procurement of Equipment has 8% magnitude.

According to Rating Impact 2 (Low):

(a) A shortage of Equipment has 15% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 15%

(c) Inefficient Use of Equipment has 46%

(d) And Procurement of Equipment has 31% magnitude.

According to Rating Impact 3 (Medium):

(a) A shortage of Equipment has 15% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 15%

(c) Inefficient Use of Equipment has 31%

(d) And Procurement of Equipment has 23% magnitude.

According to Rating Impact 4 (High):

(a) A shortage of Equipment has 31% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 31%

(c) Inefficient Use of Equipment has 15%

According to Rating Impact 5 (Very High):

(a) A shortage of Equipment has 0% probability of occurrence.

(b) Similarly, Unavailability of Efficient has Equipment 0%

(c) Inefficient Use of Equipment has 0%

### 4.6.2 Material

This category shows all the reactions against Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner, Delay in Material Procurement by Contractor. Material analysis be subject to Management Level v/s Material Reasons:

In this category of delays, to understand that how outcomes of responses were established by from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes of Shortage of Material, Improper Storage of Material leading Damages, Delay in Material to be supplied by the Owner and Delay in Material Procurement by Contractor.

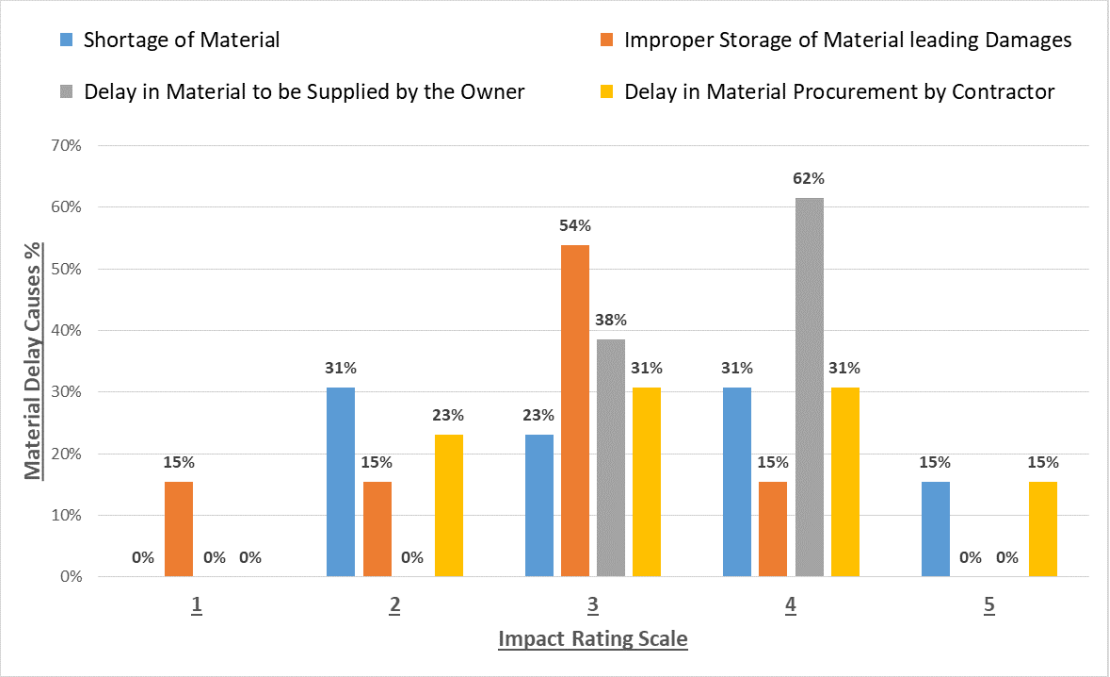


FIGURE 4.35: Rating Impact vs Causes of Delays due to Material

Figure 4.35 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Material observations. These participants had given their responses against the established reasons related to material.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A shortage of Material has 0% probability of occurrence

(b) Similarly, a total 15% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 0%.

According to Rating Impact 2 (Low):

(a) A shortage of Material has 31% probability of occurrence

(b) Similarly, a total 15% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 23%.

According to Rating Impact 3 (Medium):

(a) A shortage of Material has 23% probability of occurrence

(b) Similarly, a total 54% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 38%

(d) And Material Procurement by Contractor has 31%.

According to Rating Impact 4 (High):

(a) A shortage of Material has 31% probability of occurrence

(b) Similarly, a total 15% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 62%

(d) And Material Procurement by Contractor has 31%.

According to Rating Impact 5 (Very High):

(a) A shortage of Material has 15% probability of occurrence

(b) Similarly, a total 0% probability due to Improper Storage of Material leading Damages.

(c) Material to be supplied by the Owner has 0%

(d) And Material Procurement by Contractor has 15%

### 4.6.3 Management

This category shows all the reactions against Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time. Management analysis be subject to Management Level v/s Management Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Management observation. These participants have given their responses against the established reasons related to Management. As shown in figure 3.36

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) An Issuance of LOA has 0% of probability to delay cause.

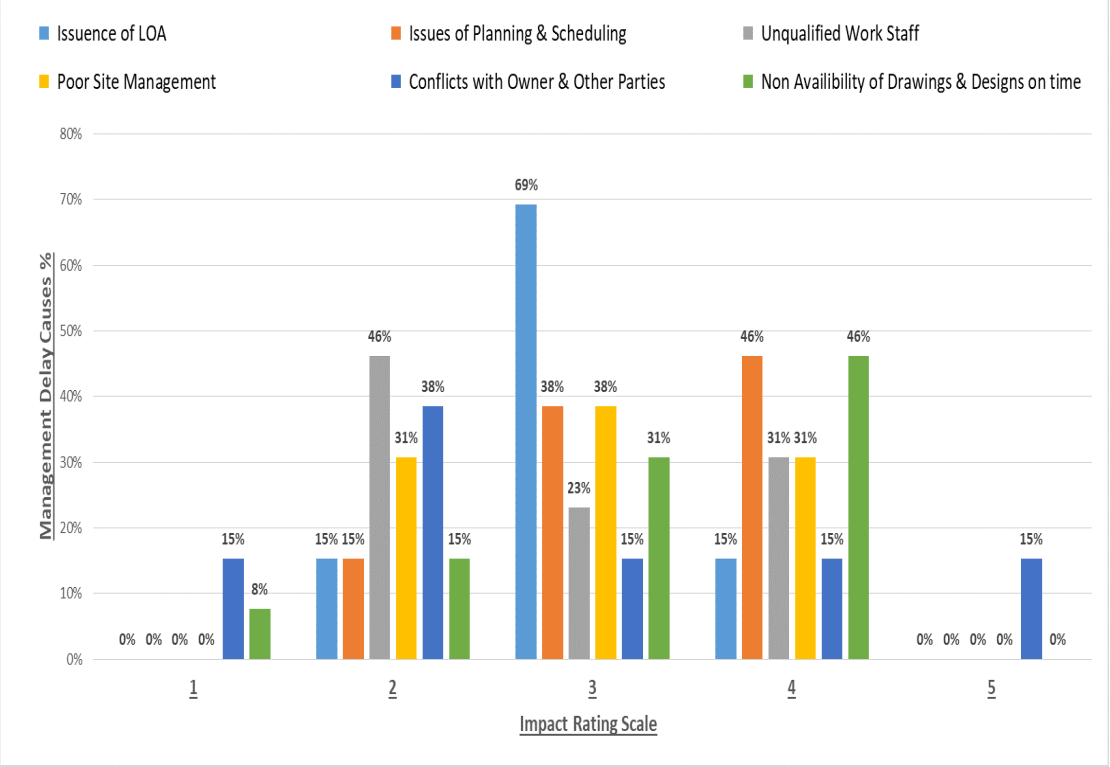


FIGURE 4.36: Rating Impact vs Causes of Delays due to Management

(b) A total of 0% due to Issues of Planning & Scheduling

(c) A total 0% due to Unqualified Work Staff.

(d) A total 0% due to Poor Site Management.

(e) A total 15% due to Conflicts with Owner and Other Parties.

(f) A total 8% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 2 (Low):

(a) An Issuance of LOA has 15% of probability to delay cause.

(b) A total of 15% due to Issues of Planning & Scheduling

(c) A total 46% due to Unqualified Work Staff.

(d) A total 31% due to Poor Site Management.

(e) A total 38% due to Conflicts with Owner and Other Parties.

(f) A total 15% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 3 (Medium):

(a) An Issuance of LOA has 69% of probability to delay cause.

(b) A total of 38% due to Issues of Planning & Scheduling

(c) A total 23% due to Unqualified Work Staff.

(d) A total 38% due to Poor Site Management.

(e) A total 15% due to Conflicts with Owner and Other Parties.

(f) A total 31% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 4 (High):

(a) An Issuance of LOA has 15% of probability to delay cause.

(b) A total of 46% due to Issues of Planning & Scheduling

(c) A total 31% due to Unqualified Work Staff.

(d) A total 31% due to Poor Site Management.

(e) A total 15% due to Conflicts with Owner and Other Parties.

(f) A total 46% probability of delays due to Non Availability of Drawings & Designs on time

According to Rating Impact 5 (Very High):

(a) An Issuance of LOA has 0% of probability to delay cause.

(b) A total of 0% due to Issues of Planning & Scheduling

(c) A total 0% due to Unqualified Work Staff.

(d) A total 0% due to Poor Site Management.

(e) A total 19% due to Conflicts with Owner and Other Parties.

(f) A total 0% probability of delays due to Non Availability of Drawings & Designs on time

### 4.6.4 Labour

This category shows all the reactions against Unskilled Labour, Lack of Skilled operator, Inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity delay which were indicated from the participant as per his encounter or extend scope. Labour analysis be subject to Management Level v/s Labour Reasons:

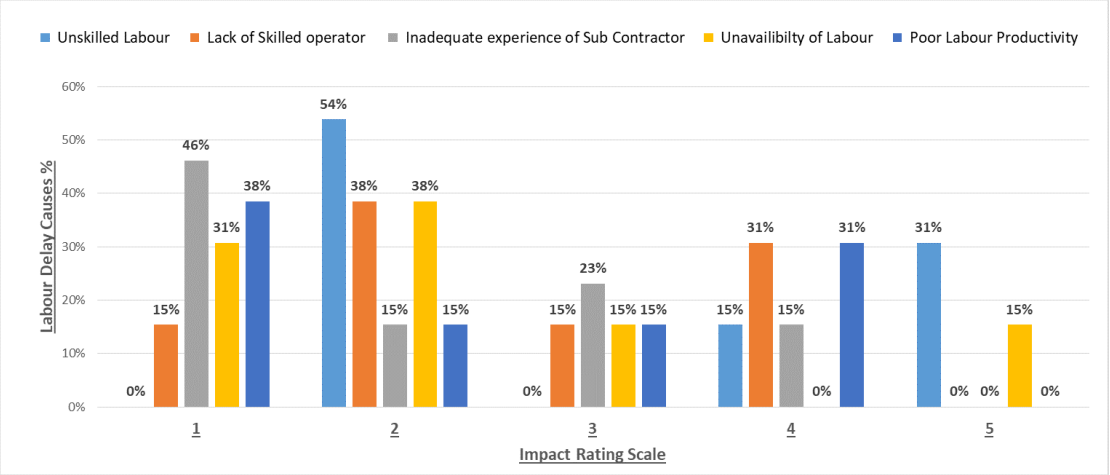


FIGURE 4.37: Rating Impact vs Causes of Delays due to Labour

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unskilled Labour, Lack of Skilled operator, inadequate experience of Sub Contractor, Unavailability of Labour and Poor Labour Productivity.

Figure 4.37 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level Vs Labour observations. These participants have given their responses against the established reasons related to Labour.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 0% of probability of delays was from Unskilled Labour.

(b) A total of 15% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 46% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 31% delays were due to Delay Unavailability of Labour.

According to Rating Impact 2 (Low):

(a) A total 54% of probability of delays was from Unskilled Labour.

(b) A total of 38% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 15% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 38% delays were due to Delay Unavailability of Labour.

(e) And Total 15% were due to Delay Poor Labour Productivity

According to Rating Impact 3 (Medium):

(a) A total 0% of probability of delays was from Unskilled Labour.

(b) A total of 15% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 23% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 15% delays were due to Delay Unavailability of Labour.

(e) And Total 15% were due to Delay Poor Labour Productivity

According to Rating Impact 4 (High):

(a) A total 15% of probability of delays was from Unskilled Labour.

(b) A total of 31% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 15% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 0% delays were due to Delay Unavailability of Labour.

(e) And Total 31% were due to Delay Poor Labour Productivity

According to Rating Impact 5 (Very High):

(a) A total 31% of probability of delays was from Unskilled Labour.

(b) A total of 0% delays were due to Improper Storage of Lack of Skilled operator

(c) A Total 0% delays were due to Delay in inadequate experience of Sub Contractor.

(d) And Total 15% delays were due to Delay Unavailability of Labour.

(e) And Total 0% were due to Delay Poor Labour Productivity

### 4.6.5 Change Order Factor

This category shows all the reactions against Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification During Construction, Change in Material Prices or Price escalation and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Change Order Factor analysis be subject to Management Level v/s Change Order Factor Reasons.

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification during Construction, Change in Material Prices or Price escalation.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Change Order Factor observations. These participants have given their responses against the established reasons related to Change Order Factor. As shown in Figure 4.38.

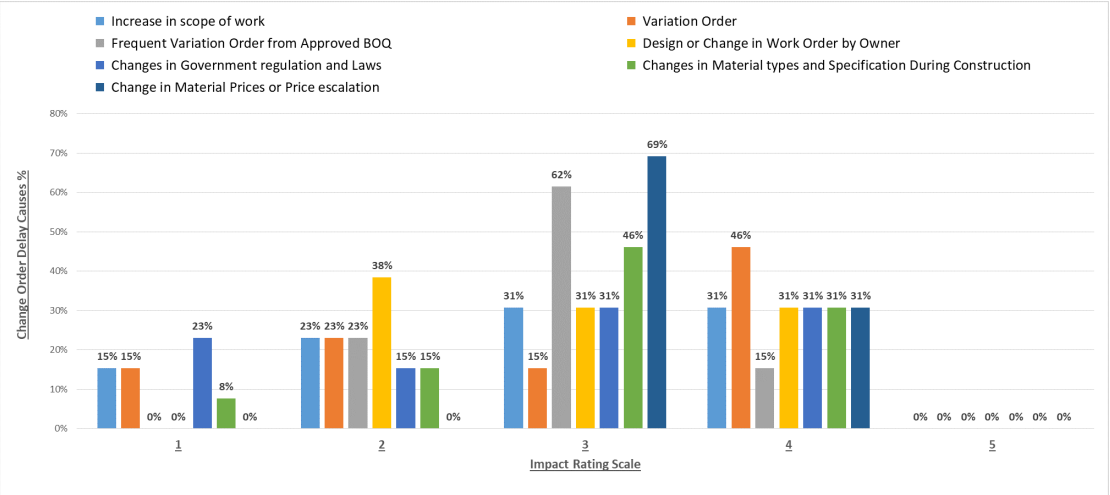


FIGURE 4.38: Rating Impact vs Causes of Delays due to Change Order Factor

Field Level: The Field level managers having 1-15 Years experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 15% Probability of delays was from Increase in scope of work

(b) A total of 15% delays were due to Variation Order

(c) A total 0% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 0% delays were due to Design or Change in Work Order by Owner

(e) A total 23% delays were due to Changes in Government regulation and Laws

(f) A total 8% delays were due to Changes in Material types and Specification During Construction

(g) And total 0% were due to Change in Material Prices or Price escalation

According to Rating Impact 2 (Low):

(a) A total 23% Probability of delays was from Increase in scope of work

(b) A total of 23% delays were due to Variation Order

(c) A total 23% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 38% delays were due to Design or Change in Work Order by Owner

(e) A total 15% delays were due to Changes in Government regulation and Laws

(f) A total 15% delays were due to Changes in Material types and Specification During Construction

(g) And total 0% were due to Change in Material Prices or Price escalation

According to Rating Impact 3 (Medium):

(a) A total 31% Probability of delays was from Increase in scope of work

(b) A total of 15% delays were due to Variation Order

(c) A Total 31% delays were due to Design or Change in Work Order by Owner

(d) A total 31% delays were due to Changes in Government regulation and Laws

(e) A total 46% delays were due to Changes in Material types and Specification During Construction

(f) And total 69% were due to Change in Material Prices or Price escalation

According to Rating Impact 4 (High):

(a) A total 31% Probability of delays was from Increase in scope of work

(b) A total of 46% delays were due to Variation Order

(c) A total 15% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 31% delays were due to Design or Change in Work Order by Owner

(e) A total 31% delays were due to Changes in Government regulation and Laws

(f) A total 31% delays were due to Changes in Material types and Specification During Construction

(g) And total 31% were due to Change in Material Prices or Price escalation

According to Rating Impact 5 (Very High):

(a) A total 0% Probability of delays was from Increase in scope of work

(b) A total of 0% delays were due to Variation Order

(c) A total 0% delays were due to Frequent Variation Order from Approved BOQ

(d) A Total 0% delays were due to Design or Change in Work Order by Owner

(e) A total 0% delays were due to Changes in Government regulation and Laws

(f) A total 0% delays were due to Changes in Material types and Specification During Construction

(g) And total 0% were due to Change in Material Prices or Price escalation

### 4.6.6 Finance Condition

This category shows all the reactions against delays Due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope.

Finance Condition analysis be subject to Management Level v/s Finance Condition Reason In this category of delays, to understand that how outcomes of responses were established from participant.

This category analysis shows the total magnitude of reasons against positions members for delays causes due to Running Bills payment to the contractors (Cash Flow), Financial Constraints of Contractors, Subcontractors running Bills issue, Delay in Finalization of Rates for Extra Items.

Figure 4.39 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Finance Condition observations. These participants have given their responses against the established reasons related to Finance Condition.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

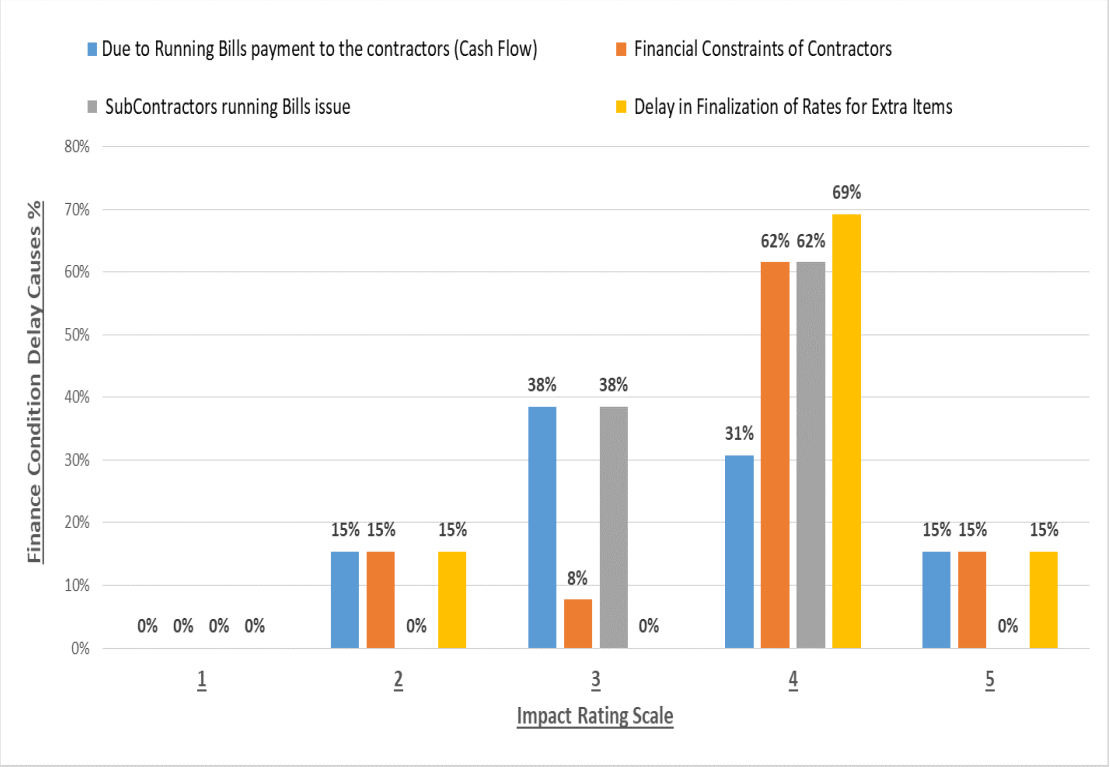


FIGURE 4.39: Rating Impact vs Causes of Delays due to Finance Condition

According to Rating Impact 1 (Very Low):

(a) A total 0% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 0% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

(d) And Total 0% were due to Finalization of Rates for Extra Items.

According to Rating Impact 2 (Low):

(a) A total 15% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 15% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

(d) And Total 15% were due to Finalization of Rates for Extra Items.

According to Rating Impact 3 (Medium):

(a) A total 38% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 8% were due to Financial Constraints of Contractors

(c) A total 38% were due to Subcontractors running Bills issue.

According to Rating Impact 4 (High):

(a) A total 31% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 62% were due to Financial Constraints of Contractors

(c) A total 62% were due to Subcontractors running Bills issue.

According to Rating Impact 5 (Very High):

(a) A total 15% delays were Due to Running Bills payment to the contractors (Cash Flow).

(b) A total of 15% were due to Financial Constraints of Contractors

(c) A total 0% were due to Subcontractors running Bills issue.

### 4.6.7 Weather/Environment Related

This category shows all the reactions against Unforeseen Weather condition, Flood, Snow, Extreme Hot Weather Condition and Other Specified delay which is able

validate or indicate the participant as per his encounter or extend scope. Weather/Environment Related analysis be subject to Management Level v/s Weather/Environment Related Condition Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Unforeseen Weather condition, Flood, Snow and Extreme Hot Weather Condition.

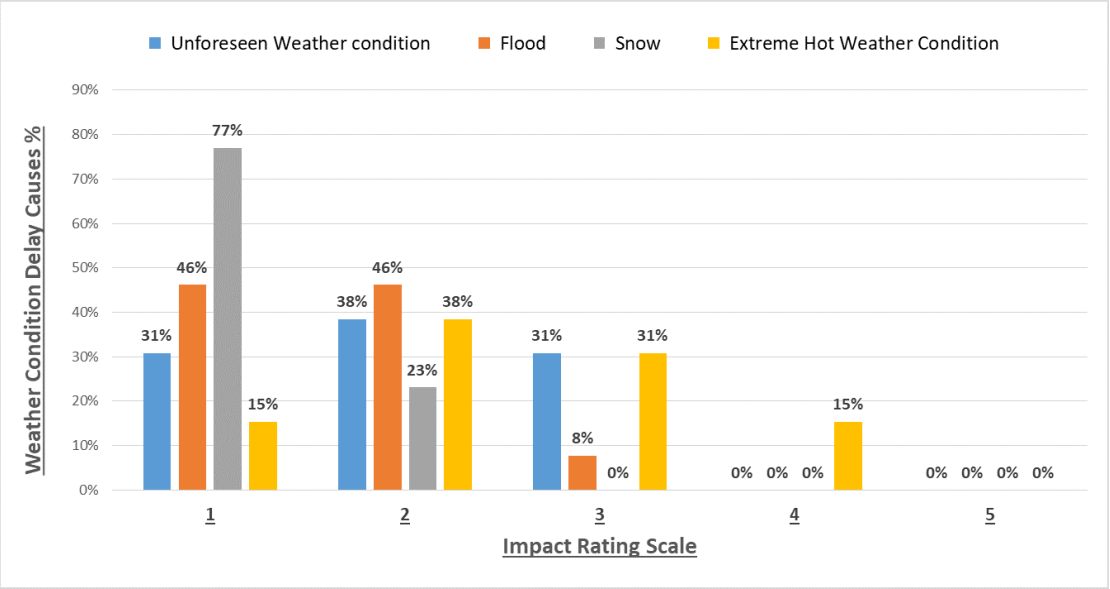


FIGURE 4.40: Rating Impact vs Causes of Delays due to Weather/Environment Related

Figure 4.40 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Weather/Environment Related observations. These participants have given their responses against the established reasons related to Weather/Environment.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) An Unforeseen Weather condition has total 31% probability to cause the delay.

(b) A Flood has total of 46% of probability.

(c) A Snow has 77% due to.

(d) And Total 15% due to Extreme Hot Weather Condition.

According to Rating Impact 2 (Low):

(a) An Unforeseen Weather condition has total 38% probability to cause the delay.

(b) A Flood has total of 46% of probability.

(c) A Snow has 23% due to.

(d) And Total 38% due to Extreme Hot Weather Condition.

According to Rating Impact 3 (Medium):

(a) An Unforeseen Weather condition has total 31% probability to cause the delay.

(b) A Flood has total of 8% of probability.

(c) A Snow has 0% due to.

(d) And Total 31% due to Extreme Hot Weather Condition.

According to Rating Impact 4 (High):

(a) An Unforeseen Weather condition has total 0% probability to cause the delay.

(b) A Flood has total of 0% of probability.

(c) A Snow has 0% due to.

(d) And Total 15% due to Extreme Hot Weather Condition.

According to Rating Impact 5 (Very High):

(a) An Unforeseen Weather condition has total 0% probability to cause the delay.

(b) A Flood has total of 0% of probability.

(c) A Snow has 0% due to.

(d) And Total 0% due to Extreme Hot Weather Condition

### 4.6.8 Site Condition

This category shows all the reactions against Due to Site Accidents due to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Site Condition analysis be subject to Management Level v/s Site Condition Reasons:

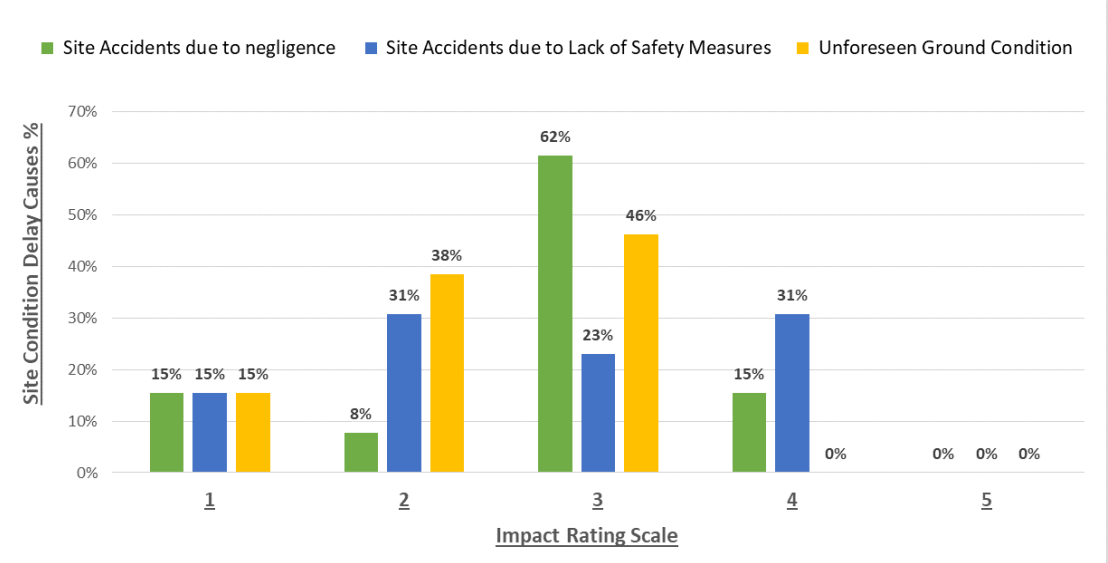


FIGURE 4.41: Rating Impact vs Causes of Delays due to Site Condition

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Site Accidents due

to negligence, Site Accidents due to Lack of Safety Measures, Unforeseen Ground Condition.

Figure 4.41 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Site Condition observations. These participants have given their responses against the established reasons related to Site Condition.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 15% delays were Due to Possession Issue.

(b) A total of 15% were due to Restricted Access at site.

According to Rating Impact 2 (Low):

(a) A total 8% delays were Due to Possession Issue.

(b) A total of 31% were due to Restricted Access at site.

According to Rating Impact 3 (Medium):

(a) A total 62% delays were Due to Possession Issue.

(b) A total of 23% were due to Restricted Access at site.

(c) A total 46% were due to Prohibited Area.

According to Rating Impact 4 (High):

(a) A total 15% delays were Due to Possession Issue.

(b) A total of 31% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 0% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area.

### 4.6.9 Land Issues

This category shows all the reactions against Due to Possession Issue, Restricted Access at site. Prohibited Area and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Land Issues analysis be subject to Management Level v/s Land Issues Reasons:

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of reasons against positions members for delays causes due to Possession Issue, Restricted Access at site and Prohibited Area.

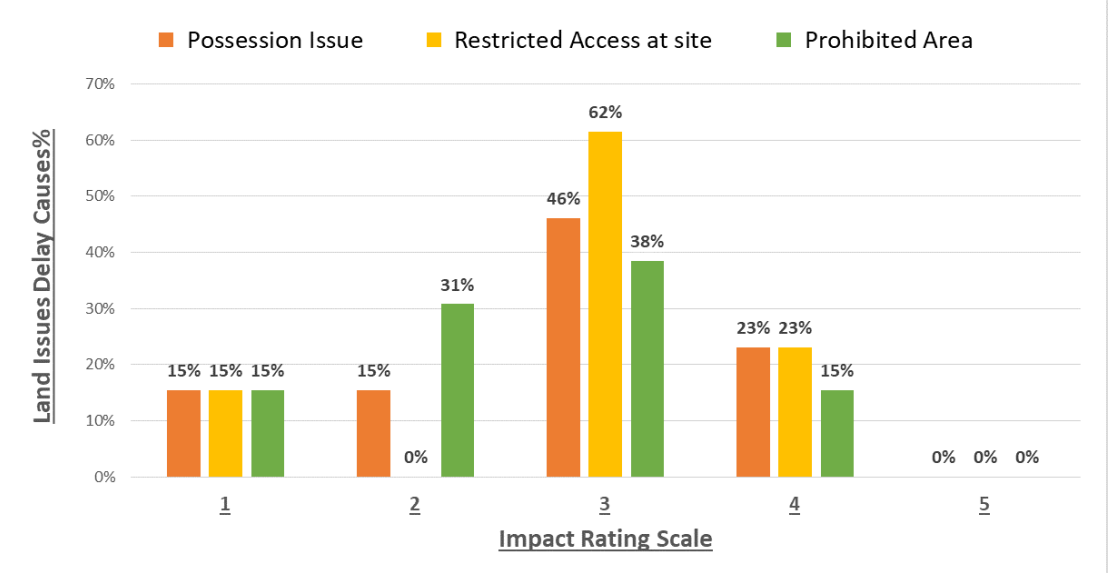


FIGURE 4.42: Rating Impact vs Causes of Delays due to Land Issues

Figure 4.42 shows the different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Land Issues Related observations. These participants have given their responses against the established reasons related to Land Issues.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) A total 15% delays were Due to Possession Issue.

(b) A total of 15% were due to Restricted Access at site.

(c) A total 15% were due to Prohibited Area.

According to Rating Impact 2 (Low):

(a) A total 15% delays were Due to Possession Issue.

(b) A total of 0% were due to Restricted Access at site.

(c) A total 31% were due to Prohibited Area.

According to Rating Impact 3 (Medium):

(a) A total 46% delays were Due to Possession Issue.

(b) A total of 62% were due to Restricted Access at site.

(c) A total 38% were due to Prohibited Area.

According to Rating Impact 4 (High):

(a) A total 23% delays were Due to Possession Issue.

(b) A total of 23% were due to Restricted Access at site.

(c) A total 15% were due to Prohibited Area.

According to Rating Impact 5 (Very High):

(a) A total 0% delays were Due to Possession Issue.

(b) A total of 0% were due to Restricted Access at site.

(c) A total 0% were due to Prohibited Area..

### 4.6.10 Approval Issues With Client

This category shows all the reactions against Due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills and Other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Approval Issues with Client analysis be subject to Management Level v/s Approval Issues with Client Reasons:

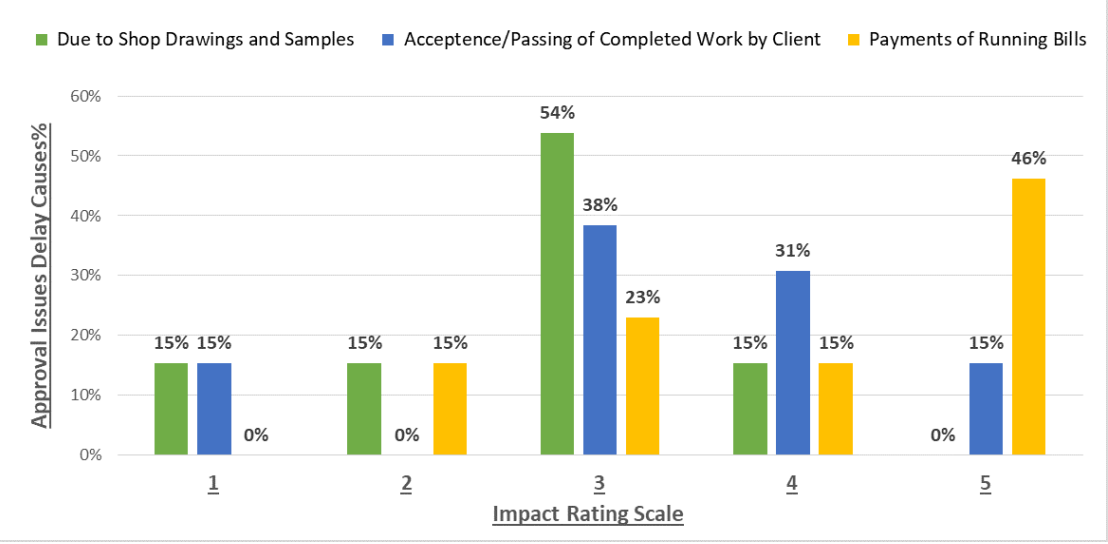


FIGURE 4.43: Rating Impact vs Causes of Delays due to Approval Issues with Client

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude

of reasons against positions members for delays causes due to Shop Drawings and Samples, Acceptance/Passing of Completed Work by Client, Payments of Running Bills.

There has different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Approval Issues with Client observations. These participants have given their responses against the established reasons related to Approval Issues with Client. As shown in Figure 4.43.

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Shop Drawings and Samples has total 15% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 15% chance

(c) Payments of Running Bills 0%.

According to Rating Impact 2 (Low):

(a) Delays due to Shop Drawings and Samples has total 15% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 0% chance

(c) Payments of Running Bills 15%.

According to Rating Impact 3 (Medium):

(a) Delays due to Shop Drawings and Samples has total 54% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 38% chance

(c) Payments of Running Bills 23%.

According to Rating Impact 4 (High):

(a) Delays due to Shop Drawings and Samples has total 15% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 31% chance

(c) Payments of Running Bills 15%.

According to Rating Impact 5 (Very High):

(a) Delays due to Shop Drawings and Samples has total 0% of probability of occurrence.

(b) Acceptance/Passing of Completed Work by Client has 15% chance

(c) Payments of Running Bills 46%.

### 4.6.11 Management Decision Making Within Organization

This category shows all the reactions against Due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Coordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner and other Specified delay which is able validate or indicate the participant as per his encounter or extend scope. Management Decision Making within Your Organization analysis be subject to Management Level v/s Management Decision Making within Your Organization Reasons

In this category of delays, to understand that how outcomes of responses were established from participant. This category analysis shows the total magnitude of

reasons against positions members for delays causes due to Approval of Completed work by Client (e.g. Stage Passing), Approval of Shop Drawings and Samples, Finalizing of rates for extra items, Frequent Change of Sub Contractor, Poor Co-ordination among Parties, Unrealistic Inspections and Testing Methods proposed in Contracts, Handing Over to Client/Customer, Slow Decision From Owner.

The different Experience level of respondents (1-15 Years of Experienced Members) as per Field level members Vs Reasons of Management Decision Making within Your Organization observations. These participants have given their responses against the established reasons related to Management Decision Making within Organization. As shown in Figure 4.44.

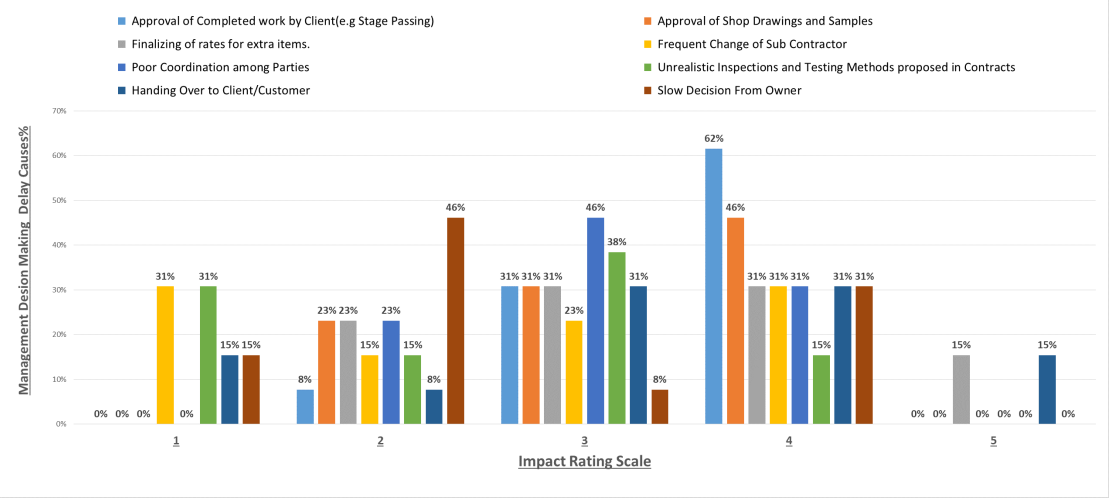


FIGURE 4.44: Rating Impact vs Causes of Delays due to Reasons of Management Decision Making within Organization

Field Level: The Field level managers having 1-15 Years Experience had the following observations:

According to Rating Impact 1 (Very Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 0% chance to delay cause.

(d) Frequent Change of Sub Contractor has 31%.

(e) Poor Coordination among Parties has 0% chance.

(f) A total 31% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 15% probability of occurrence.

According to Rating Impact 2 (Low):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 8% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 23% of total probability.

(c) Finalizing of rates for extra items also has 23% chance to delay cause.

(d) Frequent Change of Sub Contractor has 15%.

(e) Poor Coordination among Parties has 23% chance.

(f) A total 15% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 8% probability of occurrence.

According to Rating Impact 3 (Medium):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 31% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 31% of total probability.

(c) Finalizing of rates for extra items also has 31% chance to delay cause.

(d) Frequent Change of Sub Contractor has 23%.

(e) Poor Coordination among Parties has 46% chance.

(f) A total 38% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 31% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 8% probability of occurrence.

According to Rating Impact 4 (High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 62% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 46% of total probability.

(c) Finalizing of rates for extra items also has 31% chance to delay cause.

(d) Frequent Change of Sub Contractor has 31%.

(e) Poor Coordination among Parties has 31% chance.

(f) A total 15% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 31% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 31% probability of occurrence.

According to Rating Impact 5 (Very High):

(a) Delays due to Approval of Completed work by Client (e.g. Stage Passing) has 0% probability of occurrence to cause project.

(b) Approval of Shop Drawings and Samples has 0% of total probability.

(c) Finalizing of rates for extra items also has 15% chance to delay cause.

(d) Frequent Change of Sub Contractor has 0%.

(e) Poor Coordination among Parties has 0% chance.

(f) A total 0% delays were due to Unrealistic Inspections and Testing Methods proposed in Contracts

(g) Handing Over to Client/Customer has just 15% probability of occurrence.

(h) And in Last, delays due to Slow Decision from Owner has 0% probability of occurrence.

## 4.7 Top 10 Delays Reasons Effecting in Pakistan

Different level of respondent has assessed the typical probabilities of occurrence of top ten delays reasons. As shown in Fig 4.45. Author has evaluated top ten delays which were had the highest probability of occurrence to cause the delays in construction projects of Pakistan. Top ten delays were extracted from result which were collected from industry experts by visiting their organizations.

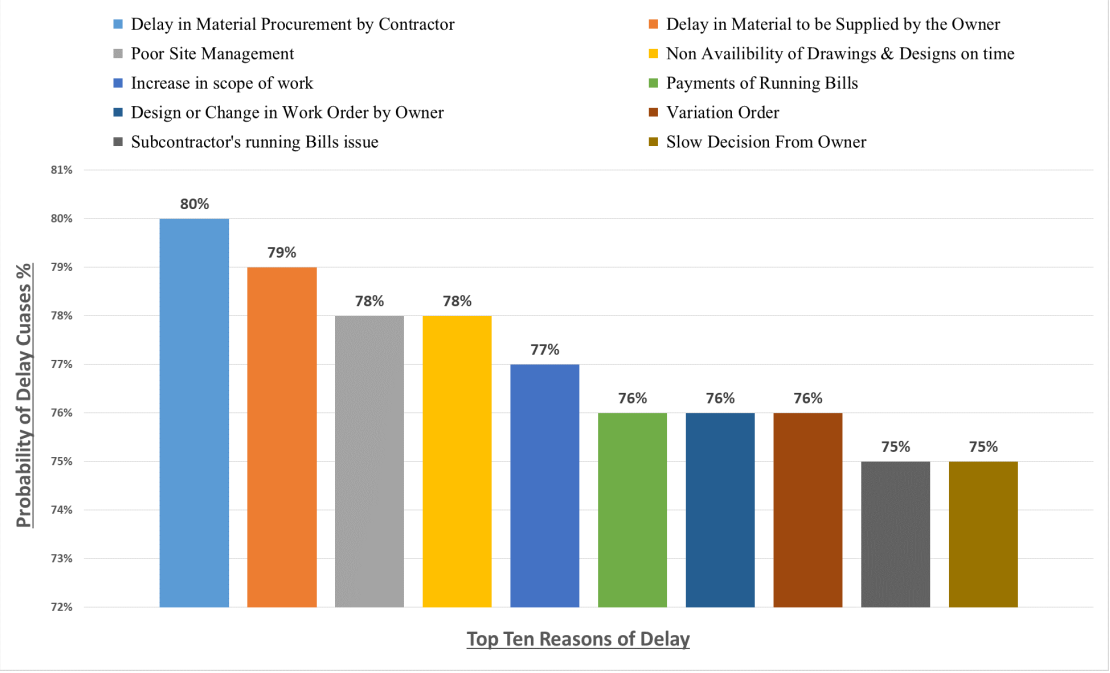


FIGURE 4.45: Top Ten Delays vs Their Impact Probability

According to Rating Impact 4 (High):

(a) Delays due to Material Procurement by Contractor has 80% probability of occurrence to cause project.

(b) Delay in Material to be supplied by the Owner has 79% of total probability.

(c) Poor Site Management has total 78% chance to delay cause.

(d) Non Availability of Drawings & Designs on time has 78%.

(e) Increase in scope of work has 77% chance.

(f) A total 76% delays were due to Payments of Running Bills

(g) Design or Change in Work Order by Owner has just 76% probability of occurrence.

(h) The total 76% delays were due to Variation Order.

(i) Subcontractor's running Bills issue has 75% probability of occurrence.

(j) Slow Decision from Owner has 75% probability of occurrence.

A summary of top ten Delays is shown in Table 4.2.

TABLE 4.2: Top Ten Delays with their percentage of effects

| S.No | Top Ten Delays Reasons | Probability |
|---|---|---|
| **1** | Delay in Material Procurement by Contractor | 80% |
| **2** | Delay in Material to be Supplied by the Owner | 79% |
| **3** | Poor Site Management | 78% |
| **4** | Non Availability of Drawings & Designs on time | 78% |
| **5** | Increase in scope of work | 77% |
| **6** | Payments of Running Bills | 76% |
| **7** | Design or Change in Work Order by Owner | 76% |
| **7** | Design or Change in Work Order by Owner | 76% |
| **8** | Variation Order | 76% |
| **9** | Subcontractors running Bills issue | 75% |
| **10** | Slow Decision From Owner | 75% |

# Chapter 5

# Findings and Discussions

## 5.1 Introduction

Analysis of causes of delays defined the findings and discussions of analyzed results which were established from considerations and evaluations of previous chapter. The delay reasons were investigated, evaluated physically and then presented. Survey responses results were compared to the professional experience of management level participants i.e. client, consultant and contractor. The total 9% was corporate levels participant, senior level participants was 45%, 34 % of intermediate levels participants and 12 % of field level participants out of 100 %.

## 5.2 Top Ten Delays Reasons Effecting The Projects In Pakistan

### 5.2.1 Delay in Material Procurement by Contractor

Material delays are most authentic delays reason in construction Project. Material related issues were prominent in previous researches. Many authors has repeated their consideration and investigation according to Material related Delays due to

Material Procurement by Contractor. Practically material related delay reasons were ranked among the top delay factors in the reviewed literature.

And Last but not least, the total 80% of delays were due to late Procurement of Material by Contractor which can cause the highly effect on project completion. As from literature Aysha Batoola, Faisal Abbass has also investigated the delays reason and evaluated that the delays due to Procurement of Material by Contractor has 40% (Frequency 4 out of total 10) of chance to cause the delay in project flow.

### 5.2.2 Delay in Material to be Supplied by The Owner

Material delays factors are most repeatedly reason in construction Project. Many authors has repeated their consideration and investigation according to Material related Delays due to Delay in Material to be supplied by the Owner. Delay in Material to be supplied by the Owner has 79% of total probability. In current study also evaluated that David Arditi ,Shruti Nayak, Atilla Damci has assessed that the total 70% delays were due to improper material to be supplied by the owner that impact the project flow.

### 5.2.3 Poor Site Management

Management delays are most genuine delays reason in construction Project. Management related issues were prominent in previous researches. Many authors has repeated their consideration and investigation according to Management related Delays due to Issuance of LOA, Issues of Planning & Scheduling, Unqualified Work Staff, Poor Site Management, Conflicts with Owner & Other Parties and Non Availability of Drawings & Designs on time. Practically Management related delay reasons were ranked among the top delay factors in the reviewed literature. In the same way the delay due to Poor Site Management has 78% chance of occurrence to cause the project completion. Ahmed Senouci, Alaa Ismail, Neil Eldin has established this reason has most likely rank 6 (9.8%) Frequency out of total 61 Frequency to may cause the project timeline.

### 5.2.4 Non Availability of Drawings & Designs On Time

Management delays are most genuine delays reason in construction Project. Management related issues were prominent in previous researches. Many authors has repeated their consideration and investigation according to Management related Delays due to Non Availability of Drawings & Designs on time. the total 78% delays were due to Non availability of drawings & designs on time that may cause the project efficiency and effect the project completion. If considered the literature Hemanta Doloi, Anil Sawhney, K.C. Iyer, Sameer Rentala has also assessed the mentioned delay causes. According to their research analysis they weighed that the Relative Importance Index of this delay cause is 0.736986 (74%) to may cause the project proficiency.

### 5.2.5 Increase in Scope of Work

Change Order Factor delays are most realistic delays reason in construction Project. Change Order Factor related issues were prominent in previous researches. Many authors has repeated their consideration and investigation according to Change Order Factor related Delays due to Increase in scope of work, Basically Change order related delay reasons were classified among the uppermost delay factors in the reviewed literature. From different level of experience managers had reflected that the total 77% of delays were due to Increase in scope of work. Krzysztof Kaczoreka has also evaluated these reasons in his study and reported these delay reasons with high rank.

### 5.2.6 Payments of Running Bills

Approval Issues with Client Related delays are the reason for the most genuine delay in construction projects. Approval Issues with Client Related issues were prominent in previous researches. Author has repetitively discussed their consideration and investigation delays causes about Due to Payments of Running

Bills. Essentially Approval Issues with Client Related delay reasons were classified among the uppermost delay factors in the reviewed literature. The total 76% of efficiency were affect due to late approval of Payments of Running Bills. Ayman H. Al-Momani notified the assessment of effectiveness of delay reason due to approval of Payments and late delivery can affect the project performance about 81.5%.

### 5.2.7 Design or Change in Work Order by Owner

Change Order Factor delays are most realistic delays reason in construction Project. Change Order Factor related issues were prominent in previous researches. Many authors has repeated their consideration and investigation according to Change Order Factor related Delays due to Design or Change in Work Order by Owner, Changes in Material types and Specification During Construction. Basically Labour related delay reasons were classified among the uppermost delay factors in the reviewed literature. The Design or Change in Work Order by Owner has 76% probability to affect the project timeline and may cause the delay Ayman H. Al-Momani has assessed that Poor Design or Change in Work Order has the most effective and repetitive delay cause in every project. This reason of delay cause the project about 24.6% and may affect the project actual duration.

### 5.2.8 Variation Order

Change Order Factor delays are most realistic delays reason in construction Project. Change Order Factor related issues were prominent in previous researches. Author has repeated their consideration and investigation according to Change Order Factor related Delays due to Increase in scope of work, Variation Order, Frequent Variation Order from Approved BOQ, Design or Change in Work Order by Owner, Changes in Government regulation and Laws, Changes in Material types and Specification During Construction, Change in Material Prices or Price escalation. Basically Labour related delay reasons were classified among the uppermost delay

factors in the reviewed literature. Similar from result the delay due to Frequent Variation Order from Approved BOQ has total 76 % of chance to cause the project timeline. Tsegay Gebrehiweta, Hanbin Luob had reported their investigation and assessed the correlation factor of Coefficient about delay due to Frequent Variation Order as per in materials. They evaluated the coefficient about 0.67 that how much this reason can affect the project productivity.

### 5.2.9 Subcontractor's Running Bills Issue

Finance Condition delays are most realistic delays reason in construction Project. Finance Condition related issues were prominent in previous researches. Various authors has repeated their consideration and investigation according to Finance Condition related Delays due to Running Bills payment, Financial Constraints of Contractors, Subcontractors running Bills issue. Basically Finance Condition related delay reasons were classified among the uppermost delay factors in the reviewed literature. From current study the total 75% delays were due to Subcontractors running Bills issue. David Arditi , Shruti Nayak, Atilla Damci has evaluated overall that, they were found that performance of a construction project is depended on payments and running bills of subcontractors.

### 5.2.10 Slow Decision from Owner

Management Decision Making within Your Organization Related delays are the reason for the most genuine delay in construction projects. Management Decision Making within Your Organization Related issues were prominent in previous researches. Different authors have repetitively discussed their consideration and investigation delays causes and reasons about Due to Slow Decision. From Owner. Basically Management Decision Making within Organization Related delay reasons were characterized among the highest delay factors in the reviewed literature. 75% were due to Slow Decision from Owner. As from Hemanta Doloi, Anil Sawhney, K.C. Iyer has dignified that Delay in handing over of site has 0.671233 relative

index and having 17 rank out of 45. Similarly according to Ghazi Saad A Elawi, Mohammed Algahtany, Dean Kashiwagi, the total 50 % of delays were due to Slow Decision from Owner.

# Chapter 6

# Conclusion & Recommendation

## 6.1 Introduction

Prepared the Questionnaire instruments Regarding Possible Delays Reason and its Sub Categories. The data was collected for analyzing purpose. Data was collected from public and private company executives after visiting, different management levels participants of organizations. (Corporate, Senior, Intermediate & Field) having different experience professionals. Statistical analysis was done from collected data. Inferencing was established from analyzed data and confirm the causes of delays.

## 6.2 Conclusion

Research project was ended with the below conclusions:

(1) The results obtained shows that the maximum evaluated delay reason related to Equipment is Shortage of Equipment and also the higher Positioned and experienced participant has ranked/Considered these delays and determined that this cause of delays is the most prominent reason of delays.

(2) The maximum evaluated cause of Material related delay is Material to be supplied by the Contractor and is considered as the most prominent reason of delays.

(3) The delay due to Poor Site Management has maximum probability of occurrence and is the most prominent reason of delays related to Management.

(4) The results obtained from the Labour related category shows that the delays due to inadequate experience of Sub Contractor and Unskilled Labour are the foremost obvious reasons of delays in construction project.

(5) In the Change Order Factor delays Causes, The most prominent reason of delay is Increase in scope of work and Design or Change in Work Order by Owner which caused project delay.

(6) Financial Condition category concluded that the most probable reason to cause delay is Running Bills payment to the contractors (Cash Flow).

(7) The category of Weather Condition determined that the most effected reason of delay is Unforeseen Weather condition.

(8) In Site Condition category, Unforeseen Ground Condition and Site Accidents due to negligence were the most achieved and possible reason of delay.

(9) The delay due to Possession Issue had the highest probability to cause delay & affect the project timeline.

(10) From Approval Issues with Client category, that the delay due to Approval of Shop Drawings and Samples with Client had the highest possibility to cause delay in the project.

## 6.3 Future Recommendation and Limitations

The research project ends up with the following recommendations for the future studies related to Delays Causes.

(1) The data set was based on only 110 respondents due to limitation of time and availability of respondents. It should be increased up to 500 number of respondents at least to arrive at even better results.

(2) The demographics of respondents should be expended to all provinces and cities of Pakistan for providing a better picture of delays applicable to entire country.

(3) Published reports of Government organizations were not available for current research. An effort he made to get these reports from Planning Commission of Pakistan for delays in construction projects.

(4) Current research was limited to housing, industrial sectors and mega construction organizations. It may be extended to roads, dams and other mega construction projects.

(5) It is important to improve the planning, management and to enhance the capability of remedial action plans for weather condition, to counter the Critical or noncritical, Excusable or non-excusable, Compensable or non-compensable, Concurrent or non-concurrent delays and mitigate them with the maximum possibility of accuracy.

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# Appendix A

Table 1: Questionnaire

| **Sr. No** | **Possible Delays Reason and its Sub Categories** | **Rating Scale** | | | | |
|---|---|---|---|---|---|---|
| | | **V. High** | **High** | **Medium** | **Low** | **V. Low** |
| | | **5** | **4** | **3** | **2** | **1** |
| **1** | **Equipment** | | | | | |
| | Shortage of Equipments | | | | | |
| | Unavailability of Efficient Equipment | | | | | |
| | Inefficient Use of Equipment | | | | | |
| | Procurement of Equipment | | | | | |
| **3** | **Management** | | | | | |
| | Issuance of LOA | | | | | |
| | Issues of Planning & Scheduling | | | | | |
| | Unqualified Work Staff | | | | | |
| | Poor Site Management | | | | | |
| | Conflicts with Owner & Other Parties | | | | | |
| | Non Availability of Drawings & Designs on time | | | | | |
| **4** | **Labour** | | | | | |
| | Unskilled Labour | | | | | |
| | Lack of Skilled operator | | | | | |
| | Inadequate experience of Sub Contractor | | | | | |
| | Unavailability of Labour | | | | | |
| | Poor Labour Productivity | | | | | |
| **5** | **Change Order Factor** | | | | | |
| | Increase in scope of work | | | | | |
| | Variation Order | | | | | |
| | Frequent Variation Order from Approved BOQ | | | | | |
| | Design or Change in Work Order by Owner | | | | | |

| **Sr. No** | **Possible Delays Reason and its Sub Categories** | **Rating Scale** | | | | |
|---|---|---|---|---|---|---|
| | | **V. High** | **High** | **Medium** | **Low** | **V. Low** |
| | | **5** | **4** | **3** | **2** | **1** |
| | Changes in Government regulation and Laws | | | | | |
| | Changes in Material types and Specification During Construction | | | | | |
| | Change in Material Prices or Price escalation | | | | | |
| **6** | **Finance Condition** | | | | | |
| | Running Bills payment to the contractors (Cash Flow) | | | | | |
| | Financial Constraints of Contractors | | | | | |
| | Subcontractors running Bills issue | | | | | |
| | Delay in Finalization of Rates for Extra Items | | | | | |
| **7** | **Weather/ Environment Related** | | | | | |
| | Unforeseen Weather condition | | | | | |
| | Flood | | | | | |
| | Snow | | | | | |
| | Extreme Hot Weather Condition | | | | | |
| **8** | **Site Condition** | | | | | |
| | Site Accidents due to negligence | | | | | |
| | Site Accidents due to Lack of Safety Measures | | | | | |
| | Unforeseen Ground Condition | | | | | |
| **9** | **Land Issues** | | | | | |
| | Possession Issue | | | | | ‘ |
| | Restricted Access at site | | | | | |
| | Prohibited Area | | | | | |
| **10** | **Approval Issues with Client** | | | | | |
| | Shop Drawings and Samples | | | | | |
| | Acceptance/Passing of Completed Work by Client | | | | | |
| | Payments of Running Bills | | | | | |

| **Sr. No** | **Possible Delays Reason and its Sub Categories** | **Rating Scale** | | | | |
|---|---|---|---|---|---|---|
| | | **V. High** | **High** | **Medium** | **Low** | **V. Low** |
| | | **5** | **4** | **3** | **2** | **1** |
| **11** | **Management Decision Making within Organization** | | | | | |
| | Approval of Completed work by Client(e.g. Stage Passing) | | | | | |
| | Approval of Shop Drawings and Samples | | | | | |
| | Finalizing of rates for extra items. | | | | | |
| | Frequent Change of Sub Contractor | | | | | |
| | Poor Coordination among Parties | | | | | |
| | Unrealistic Inspections and Testing Methods proposed in Contracts | | | | | |
| | Handing Over to Client/Customer | | | | | |
| | Slow Decision From Owner | | | | | |