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An Investigation into Causes of Accidents in Construction Projects of Pakistan

by

Atif Mehmood

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

in the

Faculty of Engineering

Department of Mechanical Engineering

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*I want to dedicate this achievement my parents, teachers and friends who always
encourage and support me in every crucial time*



CERTIFICATE OF APPROVAL

An Investigation into Causes of Accidents in Construction Projects of Pakistan

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Abstract

Construction industry is considered one of the major pillars of Pakistans economy. It is prone to accidents like any other sector in Pakistan as well as the rest of the world. During construction projects, most of the accidents occur due to various causes related to Tools, Equipment, Slips and fall, Machinery, Labour, Safety Management, Team Issues, Scaffolding/Ladder and Site Conditions. Due to the high probability of accidents in Pakistans construction industry it is highly needed to identify the causes of these accidents. The reason behind this research was to recognize accidents causes, their impact/magnitude and preventive measures. Examined categories are dependent on resource-related, site related, management-related, builder management issues, and consumer relations, which can cause accidents that impact project timeline. For the preparation of survey instrument literature review is performed to extract the reasons of accidents. Questionnaire was established from literature which was based on 9 main categories and 39 sub categories. Interviews were conducted from different experts of Pakistan construction industry for results. Results are compiled by evaluating the impact of each accident reason using statistical analysis. Top ten accidents causes were extracted and compared with published results. Top ten accident reasons include, Lack of safety rules and work procedure 74%, Lack of training 73%, Lack of enforcement of safety rules 72%, Careless actions of worker himself 69%, Falls from heights 69%, Deficient enforcement of training 67%, Falling debris, material or objects 67%, Unsafe site conditions 66%, Eyes effected by UV rays during welding 64%, Slips and falls on the floor/roof 64%. To overcome the top 10 accident causes preventive measures are recommended. Impactful or non-simultaneous Accidents in the construction project can be reduced by improving planning, management, site coordination, and by increasing safety resources, capacity of safety parameter.

Keywords: Accidents Categories, Accidents Reasons, Accident Analysis, Slips and Falls, Machinery, Labour, Safety Management, Equipment, Team Issues, Scaffolding/ Ladder, Site Condition, Fire & Explosion.

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Chapter 1

Introduction

The construction industry has the highest fatal injury and incidence rates compared to other industries. The average mortality rate in 2012-2016 was 4.1 per 100,000 workers (Labor Inspection Authority, 2017). The collaboration consistently requires more knowledge on risk, their causal factors. However, they rarely experience serious accidents. Consequently, no actor in the industry has significant cases of risk types and their obstacle failures. The purpose of this study was to identify accidental type and to prioritize preventive measures within the construction industry. The production of relevant knowledge about hazards is problematic because national data on hazards and injuries generally do not allow the identification of mechanics and a detailed analysis of the causes of injuries.

Construction may be a high-risk industry worldwide. Since 2012, the amount of deaths within the construction sector has been above that of coal mines. Compared to other industries, the development industry features a poor working environment, complex situation and high labor turnover rates, lack of safety management, lack of proper educational standards and fewer trained workers. Figures released by the Ministry of Housing and Urban-Rural Development of the People's Republic of China (Ministry of Housing and Urban-Rural Development, 2017) show the amount of construction accidents.

Within the first nine years, the amount of accidents decreased because the Chinese government implemented some policies in 2004, a crucial policy entitled "Regulations on Safety Product Management of Construction Projects" was launched in

February 2014. However, within the results of the last three years, the amount of accidents had decreased slightly, which remains above most developed countries. In 2016, there have been 634 accidents, an equivalent number as in 2010. In contrast, mortality rates within the construction sector reflect an identical trend. Therefore, the feasibility situation should be improved. To stop a rise in structural accidents and deaths, a transparent understanding of structural hazards is important.

In Europe, housing industry was one among the highest five most accidents causing industry in 2014. In Norway, the development industry had the second largest accidents in 2016, one in five most accidents causing country. Accident prevention starts with clearly understood factors that play a crucial role in work-cause. There's little research on unsafe behavior and major causes in reviewing construction site safety which will cause accidents on construction sites. Information about accident mechanisms and injury agents are often extracted from national injury statistics. These accidents were relatively severe, and therefore the qualitative documentation of the accidents was evaluated to be sufficient to assess causal factors employing a holistic system model.

Globally, the construction industry operates as the largest engineering sector. According to this sector, there are many construction projects going on around the world. The successful execution of a construction project based on proper planning and depending on the development process. There are many construction projects that face various problems like accidents in implementing their timetable. Construction constraints enable accidents to accomplish project completion.

In this case of the thesis, understanding various Accidents causes that will prevent a project from being completed within a specified or limited time. Therefore, to find or show a variety of causes and reasons the author has a proven method of analyzing accidents in construction activities. Accidents problems are considered common problems in construction projects.

Accidents mean lack of Personal Protection Equipments (PPEs) due to unavailability of production facilities and safety management facilities. In some cases, for contractors, Accidents mean higher danger due to less protection measures, higher

probability of accidents for inflation, and consequently higher Personal Protection Equipments costs. The categories included group performance, Safety Equipments availability, environmental factors, Slips and fall, Machinery, Labour, Safety Management, Team Issues, Scaffolding/Ladder and Site Condition. However, it is rare that the project is completed within the stipulated time.

1.1 Background of Pakistan Construction Industry

The Work of construction is increasing in Pakistan. Construction Development is also promoting at Government level. The construction industry is experiencing severe accidents issues. The factors of accidents 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 accidents problems. The most common factors of accidents are: natural disaster in Pakistan like flood and earthquake and also some others like Crane or hoist accidents, Falls from heights, Slip and falls, Gas leaks, fires, and explosions Issues, improper planning, poor safety management. Author is also working in construction industry from past 6 Years and experienced that there is no relevant literature available of accidents problems in Pakistan. Therefore present thesis was focused on investigating causes of accidents 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 accidents is very high in mega projects of public and private sectors.

A construction project is usually accepted as successful when it has less Accidents in projects, proper safety management budget, depending on the specifications, and the satisfaction of the participants about PPEs & safety measures. Before any discussion of accidents analysis begin, a clear understanding of the general types

of accidents is necessary. There are following categories of accidents:

- (1). **Crane or winch accidents.** Cranes and winches are significant construction tools. However, lack of instruction, operator faults, and other factors can cause serious accidents on construction sites.
- (2). **Falls from heights.** Scaffolding accidents, falls from ladder accidents, roofing accidents, and other falls from heights may result in tragic construction accidents.
- (3). **Slip and falls.** A slip and fall on the bottommost can cause broken bones, sprains, and other injuries.
- (4). **Repetitive stress injuries.** The repetitive nature of some construction work may result in repetitive stress injuries within the back, wrists, ankles, and joints.
- (5). **Gas leaks, fires, and explosions.** Gas disruptions, flames, and blasts are regularly unexpected and deadly. Carbon monoxide, for example, are frequently risky during a limited construction space.
- (6). **Forklift accidents.** Without proper training and attentive operators, forklifts are often dangerous and end in serious construction accidents.
- (7). **Trench accidents.** A trench collapse or an accident within a trench are often devastating. A hard hat could also be trapped and unable to urge out on his own.
- (8). **Elevator shaft accidents.** Construction workers could also be in danger of falling down elevator shafts if safety precautions aren't in situ
- (9). **Electrocutions.** Electrical equipment, overhead electrical wires, wiring, and lightning all create risks of electrocution for construction workers.
- (10). **Machinery accidents.** Heavy machines are essential to finish construction project, but they also create real risks for construction workers once they malfunction or when an operator is negligent.

- (11). **Struck-by accidents.** Motor vehicles are common on construction sites. A hard hat is in danger of being struck by a automobile or piece of machinery while performing on a construction site.
- (12). **Caught-between accidents.** A limb or a whole person may get caught by a bit of kit or crushed by the debris of a construction accident.
- (13). **Exposure to dangerous chemicals or toxins.** Taking in specific synthetic compounds or poisons can make development laborers endure genuine respiratory infection.

1.2 Problem Statement

Construction industry is considered one of the major pillars of Pakistans economy. It is proved to accidents like any other sector in Pakistan as well as the rest of the world. However the accidents data is either not mentioned or analyzed at national level by both public and private organizations contrary to the western countries. Therefore it was considered of paramount importance to carry out An investigation into causes of Accidents in construction projects of Pakistan.

1.3 Aim of the Study

The important aim of this research are following:

- To identify the causes of accidents in worldwide construction industry through literature review.
- Gather the main subcategories of accidents.
- Prepare a questionnaire instrument to seek information from Pakistani construction industry experts
- Collect data from public and private company executives, middle level managers and working professionals through the questionnaire survey regarding causes of accidents in Pakistani industry.

- Draw inferences from data collected and confirm the causes of accidents.
- Identify any other research areas to be recommended to future researchers in the same area for Pakistani construction industry.

1.4 Methodology of Research

This research was conducted in the following steps:

- Review of literature
- Preparation of survey instrument
- Collection of data from Pakistani industry and professionals
- Compilation and statistical analysis of data
- Inferencing from data to arrive at results and findings of study
- Discussion of results on the basis of past research
- Conclusions and future recommendations

1.5 Summary

Current research is anticipated to give a framework of major causes of accidents in construction industry as examined in past around the world. Findings and results will be accumulated in form of major and sub categories of causes of accidents 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 accidents in Pakistan for the reference of future researchers. A step by step approach adopted in current study will also be valuable for future research.

Chapter 2

Literature Review

Various Investigations were accompanied on reasons of accidents in housing industry. Author established 39 causes of accidents and gathered into 9 (nine) major Categories with diverse levels of significance. Categories of Accidents and their reasons were examined from literature and details of those categories and relevant literature is discussed below.

2.1 Slips and Falls

Accidents due to Slip & Fall (due to tripping, slipping, or sitting, fall from equipment, jumps to lower level) are the most common accidents causes in construction projects. Authors investigated the accidents due to fall from a higher level, Falls, slips, Falls to lower level, fall from collapsing structure or equipment, fall through surface or existing opening, leaps to bring down level, the conversation of referenced mishaps' reasons demonstrated that China development organizations have encountered a bigger number of Accidents in their projects than United States and South Korea development organizations [4].

Authors investigated that the accidents due to falling/collapsing objects which can cause failure. As they discussed that development of a monitoring and periodical reporting of critical and long lead reasons to supply a narrative explanation of

causes of slip and falls from height and from object and recommended to settle on experienced Safety Management PPEs with good reputation [1].

2.2 Machinery

Machinery related accidents are very common accidents in construction industry. Authors investigated accidents due to vehicles, machines and loss of control of machines. Their research was conducted on construction projects generally or building construction or highway projects. The methodology they used; the descriptive epidemiology is an often-used method in investigation of construction accidents on national, regional, or company level [2]. The steps within the incident concentration analysis utilized in this research are to:

- (1). Establish uni-variate and bi-variate distributions for scopes.
- (2). Select concentrations for creating up a big portion of the entire number of records (e.g. 510 out of fifty records) with similar characteristics.
- (3). Analyze these concentrations in additional detail.
- (4). Search for similarities in activities, sequence of events and energy involved.

The framework was utilized in this analysis supported three elements that are basic in many accident models namely hazards, barriers/defenses. Material related issues were prominent in research. Authors investigated the causes of accidents associated with Machinery. Consistent with their research, lack of skilled operators and safety measurements caused accidents to occur in construction project [1, 11].

2.3 Labour

Accidents due to Labour issues are the most common accidents issues in construction industry around the world.

Authors reported the different causes of accidents due to lack of training. They focused on Chinese Construction Accidents of completed projects. These projects were initiated by Application of Accidents Analysis methods by Chinese Construction Accidents [2, 11].

Authors investigated the accidents due to lack of technical work staff training, poor site management, recruitment of older worker in construction Industry, which can cause and can affect execution plan of construction project.

The major causes of construction accidents were identified and ranked accordingly. The proposed method was used for the maintenance and rehabilitation of streets and entrances to neighborhoods [5,11].

2.4 Safety Management

Construction accidents means the injuries that have been caused due to improper safety management. Such accidents affect and escalate the date of the contract or the day the stakeholders have settled on the handing over of the project. Accidents are often a costly affair and also affect the time required to execute or complete the contract.

Numerous attempts have been made to investigate the causes of accidents in various countries. For example, lack of Safety Management, Poor Labor Training are the main causes of accidents in construction project.

It was investigated that the poor performance and lack of skilled operator can cause accidents in project. They investigated that how lack of skilled operator caused accident in the project, investigation based on by using the Fault Tree Analysis method. The whole project depends on the efficiency of the Safety Management.

If the highly skilled workers or sub-contractors do not possess the availability of PPEs, it also causes Accidents [7]. Authors investigated the accidents due to inadequate & Unavailability of safety management and also discussed how it can cause accident in project, by using the methodology: Measures through Modulation Model Fault Tree Analysis[21,22].

2.5 Equipment

Accidents due to Faulty equipment, Misplacing objects, Defective machinery on site and Defective forklift are known as Equipment Related Accidents that cause the projects failure. If the safety measures constraint of equipment in the project is strong, the project will proceed in the intended time. Factors affecting the accidents due to equipment in construction projects were discussed in current research. It is important to study these cost dependent factors and to avoid them for maximum benefits. It was investigated the accidents due to reasons related to equipment. The study showed that the accidents problems due to contractor negligence is major factor. They had researched to identify the rank of the reasons causing accidents in Project [2]. Authors have also conducted the investigation regarding the reasons of accidents in detail in their research, as accidents due to faulty equipment, Misplacing objects and Defective machinery on site can lead to failure of project [10].

2.6 Team Issues

Lack of team work training, inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job are the team issues which cause accidents in a construction project. While site management of a construction contract cannot control the Accidents, they should anticipate the possibility of adverse accidents and address it in their contracts. Team issues accidents can impact on construction projects.

Lack of team work training can upsurge the impact of accident on construction site, which can stick and obstruct the construction flow. Accidents due to inadequate construction planning and scheduling can strain the project and cause breakage. Accidents due to Supervisory faults, Lack of knowledge/skills of job can reduce the efficiency of project like sealants and mortar. Authors investigated more general accidents causes and types of accidents events, within the responsibility of each party, thus providing a useful tool for better project control. Provided Project level

analysis of special trade contractor fatalities using accident investigation report. According to their research recommendations, accidents due to lack of long term planning and execution strategies, lack of Safety measures regarding team issues can be reduced by using proper safety condition tools and remedial preventive action[1,26].

2.7 Scaffolding/Ladder

Accidents due to improper use of Scaffolding & Ladders are very common in construction Industry. These accident are caused due to Scaffolding not properly installed, or may be inappropriate use of ladders and hoists, due to collapse of scaffold leading to damages of adjacent property and mostly due to loose bonding of scaffolding.

Authors reviewed accidents because of falling/imploding from objects, tumble from stepping stool, and tumble from stage and examined to perceive the misfortunes reasons [1]. These accidents by and large occurred during fix or possibly scaffolding on the front of structures. Authors utilized decreased framework that is a regularly utilized strategy in appraisal of headway disasters on worldwide and public level [2]. This evaluation utilized an essentially indistinguishable methodology that was utilized in mechanical settings.

2.8 Site Condition

Site conditions issues vary from project to project. Accidents due to site unforeseen conditions are caused due to site management, less safety methods and project related effects on site conditions (e.g. wet slippery floors, Unstable stacking of materials, Poor storage combustible materials). Authors investigated the impact of accident causes on during construction due to negligence on site. They compared the three groups of respondents (proprietors, experts, and temporary workers) to utilize distinctive ways of source [2]. Moreover it was investigated about location mishaps due to need of security measures by making the choice to demonstrate

examination to mitigate accidents [10].

Accidents due to site unforeseen conditions regarding subsurface conditions (e.g. soil, high water table, etc.) caused worse impact on project. Authors evaluated the report regarding accidents impact on the project during construction due to negligence on site by statistical analysis. In their study, data was analyzed using statistical package. Exact information was communicated as middle and reach to look at the three gatherings of respondents (proprietors, experts, and temporary workers) utilizing different way of source. It was also examined site accidents due to less Safety methods by making the decision model analysis to relocate the impact of obtained Accidents [5, 15].

It was mentioned Unforeseen Ground Condition and its effectiveness in construction projects in their investigation. Authors investigated accidents causes and identified about 20 major causes which lead to cost and time over run in infrastructure sector. They showed the ranking for each factor arranged according to their importance, one of these is Unforeseen Ground Condition [4, 7]. Authors investigated the quantitative analysis about Unforeseen Ground Conditions impact & Effect in construction project that how much these reason cause accidents in the project [24].

2.9 Fire & Explosion

Norwegian construction industry investigated the accidents Due to Fire & Explosion. The most frequent accident types include: Fires and explosions, Trench collapse, Affect by toxic gases, Eyes affected by UV rays during welding, skin burn in welding process.

A comparison of the injury tests indicated that the dispersion of mishap types shifted with respect to seriousness and different construction types.

Authors investigated accidents due to fire & explosion examined accidents Issues in their investigations and assessed the accidents caused due to swear elements or conditions, Exposure to Electric shock and accidents due to fires and explosions [4,24].

Authors investigated and discussed detailed causes of Accidents in their research regarding Fire & Explosion category. They used the methodology of analyzing and evaluating the accidents amounts in Construction Industry which comprises a few phases: the identification of causes of Accidents, the arrangement of literature data and the formulation of computer knowledge base and so on. Authors evaluated the result that each accident has different Scenario can be introduced as a coordinated diagram [11,14].

2.10 Summary

According to various literature papers, authors enlisted or generated the different causes of accidents. Many authors investigated and repeated the frequent accident causes that can impact and effect the running construction project. A questionnaire was prepared by incorporating accident causes were stated in the literature. The total 39 accident reasons were established 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

Research Methodology

3.1 Introduction

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

3.2 Scale Utilization for Impact Identification of Accident Causes

The survey was made from diverse inquire about sources of literature that how the accident causes were distinguished and categorized. The consideration of writing was established from distinctive authors literature those who were considered the related parameters of acquired subject. The reasons of accidents were highlighted in present research which lead to affect the construction project. After highlighting, the causes of accidents were distinguished in 9 main sub categories which were

based on 39 accidents reasons. Then the accidents were categorized regarding their rating scale which indicated the impact of accidents cause in construction project. 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 accidents reason and its sub categories:

3.3 Identification of Accident Causes by Categories

3.3.1 Slips and Falls

- Falls from heights
- Slips and falls on the floor/roof
- Falling debris, material or objects
- Fall from opening or stairways

3.3.2 Machinery

- Getting caught in between objects or materials
- Machinery accidents
- Getting hit by a vehicle
- Hit by a crane

3.3.3 Labor

- Overexertion and physical fatigue
- Careless actions of worker himself
- Lack of training

- Improper footwear
- Absent-mindedness/nervousness

3.3.4 Safety Management

- Unsafe site conditions
- Deficient enforcement of training
- Unsafe method or sequencing
- Took unsafe position or posture
- Lack of enforcement of safety rules
- Lack of safety rules and work procedure

3.3.5 Equipment

- Faulty equipment
- Misplacing objects
- Defective machinery on site
- Defective forklift

3.3.6 Team Issues

- Lack of team work
- Inadequate construction planning and scheduling
- Supervisory faults
- Lack of knowledge/skills of job

3.3.7 Scaffolding/Ladder

- Scaffolding not properly installed
- Inappropriate use of ladders and hoists
- Collapse of scaffold causing damage to adjacent property
- Loose bonding of scaffolding

3.3.8 Site Condition

- Wet slippery floors
- Unstable stacking of materials
- Poor storage of combustible materials

3.3.9 Due to Fire and Explosion

- Fires and explosions
- Trench collapse
- Affected by toxic gases
- Eyes effected by UV rays during welding
- Skin burn in welding process

Questionnaire was prepared by incorporating the key accidents causes reported in the literature. A total of 39 delay reasons were identified in this research.

3.4 Technique of Analysis

- Literature Review.
- Compile main and subcategories of accidents.

- To collect data from construction industry executives.
- Describe and inferences the data.
- To make groups of respondents by demographically.
- Evaluate the impact of each accidents reason.
- Count the impact value against number of respondents for each unstructured reason.
- Summarize the impact value of collected data.
- Draw the conclusions summary of data by graphical expression.

3.5 Summary

Questionnaire was derived from previous research study of different literatures. The generated questionnaire sample was related to construction project accidents. From literature analysis, the list of highly probable causes of accidents 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).

A questionnaire was prepared through detailed literature study based on construction projects accidents. For the preparation of questionnaire, a list of highly probable accident reasons was identified from different research work. This questionnaire was then sent to number of selected participants. These participants belonged from different Government, private and industrial sectors having different field like Architecture, Building design, Infrastructure

Chapter 4

Results and Analysis

4.1 Introduction

The questionnaire evaluated from previous research study of different literatures was related to causes of accidents in construction project. From literature, the most possible causes of accidents emphasized in a construction project were enlisted. Further, the number of participant responses were collected from diverse particular organization (e.g. Client, Consultant, Contractor, Sub-Contractor, supplier & Academician) and from different area of fields (e.g. Architecture, Building design, Infrastructure management, Construction management, Quantity surveying, Engineering, Site execution, Project management & financial consultancy). Both group of respondents are related from different types of construction (e.g. Residential, Commercial, Road/Highway, Infrastructure, High Rise/Apartments, Multistory).

The information was collected from diverse management levels of organizations (Corporate, Senior, Intermediate and Field Level) having different experience level. The real time information data was collected from management level members. The analysis gathered responses result was based on Management Positions members having 1 year to up to 60 Years professional experience v/s category observation. The position depended on, Corporate, Senior, Intermediate & Field Level.

4.2 Demographics of Respondents

Identified the causes of delays in Pakistan construction industry through collection of data from industry experts 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 (8%) were from Corporate Level respondents having 30 Years Experience, 48 (44%) From Senior having Upto 60 Years Experience, 40 (36%) number of Respondents those having 15 Years Experience were from Intermediate level and 13 (12%) Respondents having Less than 15 Years Experience of Field Level participants. As shown in Table 4.2.

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	40	15 Years
4	Field Level	13	Less than 15 Years

4.3 Corporate Level

4.3.1 Slips and Falls

This category examination shows the reactions against Falls from heights, Slips and falls on the floor/roof, falling debris, material or objects, fall from opening or stairways which is able demonstrate or indicate the member as per his encounter or extend scope of Slips and falls.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to fall from heights, Slips and falls on the floor/roof, falling debris, material or objects.

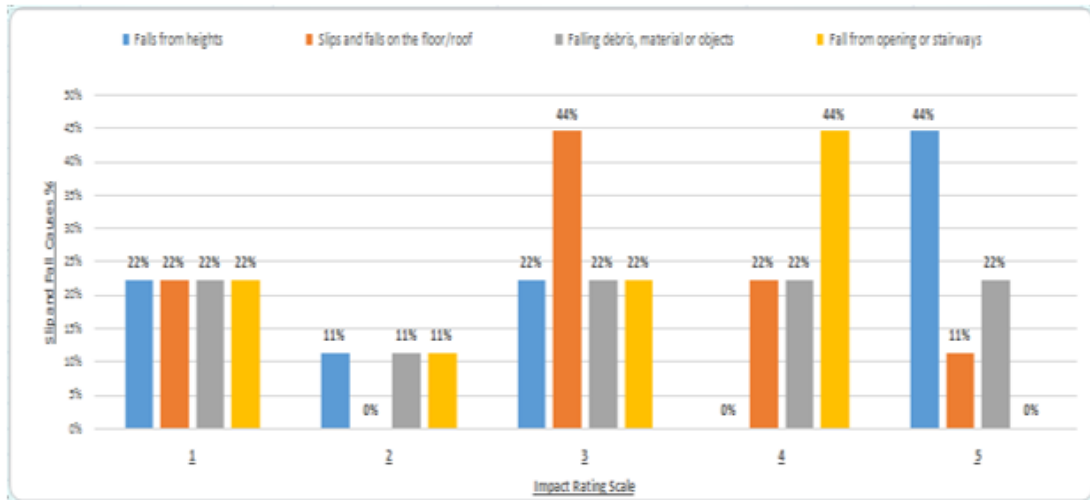


FIGURE 4.1: Rating Impact vs Causes of Accidents due to Slip and Fall

Corporate level members had given their responses against the established reasons related to Slips and falls. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Fall from heights has 22% of probability to cause an accident.
- A total of 22% due to slip and fall on the floor/roof.
- A total 22% due to falling debris, material or objects.
- A total 22% due to fall from opening or stairways.

According to Rating Impact 2 (Low):

- Fall from heights has 11% of probability to cause an accident.
- A total of 0% due to slip and fall on the floor/roof.
- A total 11% due to falling debris, material or objects.
- A total 11% due to fall from opening or stairways.

According to Rating Impact 3 (Medium):

- Fall from heights has 22% of probability to cause an accident.
- A total of 44% due to slip and fall on the floor/roof.
- A total 22% due to falling debris, material or objects.
- A total 22% due to fall from opening or stairways.

According to Rating Impact 4 (High):

- Fall from heights has 0% of probability to cause an accident.
- A total of 22% due to slip and fall on the floor/roof.

- (c). A total 22% due to falling debris, material or objects.
- (d). A total 44% due to fall from opening or stairways.

According to Rating Impact 5 (Very High):

- (a). Fall from heights has 44% of probability to cause an accident.
- (b). A total of 11% due to slip and fall on the floor/roof.
- (c). A total 22% due to falling debris, material or objects.
- (d). A total 0% due to fall from opening or stairways.

4.3.2 Machinery

This category examination shows the reactions against Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a Crane. In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a crane.

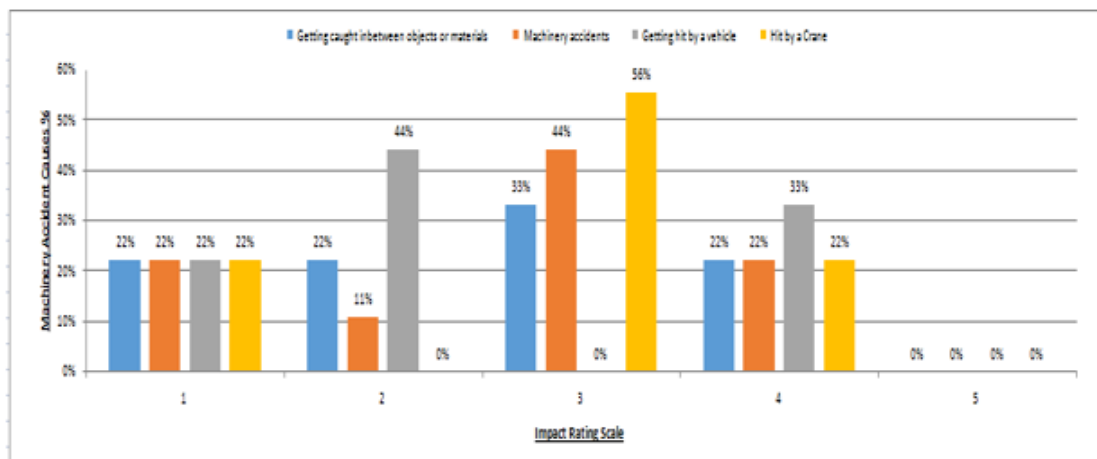


FIGURE 4.2: Rating Impact vs Causes of Accidents due to Machinery

Corporate level members had given the following responses against the established reasons related to machinery. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Getting caught in between objects or materials has 22% of probability to cause an accident.

(b). A total of 22% due to machinery accidents.

(c). A total 22% due to getting hit by a vehicle.

(d). A total 22% due to hit by a crane.

According to Rating Impact 2 (Low):

(a). Getting caught in between objects or materials has 22% of probability to cause an accident.

(b). A total of 11% due to machinery accidents.

(c). A total 44% due to getting hit by a vehicle.

(d). A total 0% due to hit by a crane.

According to Rating Impact 3 (Medium):

(a). Getting caught in between objects or materials has 33% of probability to cause an accident.

(b). A total of 44% due to machinery accidents.

(c). A total 0% due to getting hit by a vehicle.

(d). A total 56% due to hit by a crane.

According to Rating Impact 4 (High):

(a). Getting caught in between objects or materials has 22% of probability to cause an accident.

(b). A total of 22% due to machinery accidents.

(c). A total 33% due to getting hit by a vehicle.

(d). A total 22% due to hit by a crane.

According to Rating Impact 5 (Very High):

(a). Getting caught in between objects or materials has 0% of probability to cause an accident.

(b). A total of 0% due to machinery accidents.

(c). A total 0% due to getting hit by a vehicle.

(d). A total 0% due to hit by a crane.

4.3.3 Labour

This category examination shows the complete aggregate of responses against Overexertion and physical fatigue, Careless actions of worker himself, Lack of

training, Improper foot ware, Absent-mindedness/Nervousness which are able approve or demonstrate the member as per his experience or amplify scope. Labour analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes of Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, improper foot ware, Absent-mindedness/Nervousness.

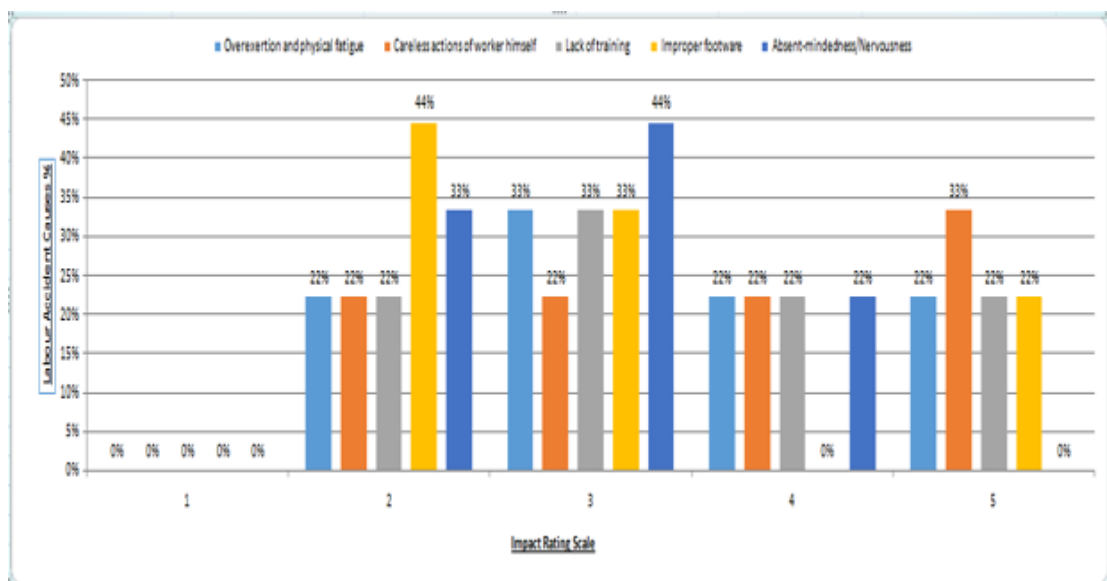


FIGURE 4.3: Rating Impact vs Causes of Accidents due to Labour

Corporate level members had given the following responses against the established reasons related to labour. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Overexertion and physical fatigue have 0% of probability to cause an accident.
- A total of 0% due to Careless actions of worker himself.
- A total 0% due to Lack of training.
- A total 0% due to improper foot ware.
- A total 0% due to absent-mindedness/Nervousness.

According to Rating Impact 2 (Low):

- Overexertion and physical fatigue have 22% of probability to cause an accident.
- A total of 22% due to Careless actions of worker himself.

- (c). A total 22% due to Lack of training.
- (d). A total 33% due to improper foot ware.
- (e). A total 44% due to absent-mindedness/Nervousness.

According to Rating Impact 3 (Medium):

- (a). Overexertion and physical fatigue has 33% of probability to cause an accident.
- (b). A total of 22% due to Careless actions of worker himself.
- (c). A total 33% due to Lack of training.
- (d). A total 33% due to improper foot ware.
- (e). A total 44% due to absent-mindedness/Nervousness.

According to Rating Impact 4 (High):

- (a). Overexertion and physical fatigue has 22% of probability to cause an accident.
- (b). A total of 22% due to Careless actions of worker himself.
- (c). A total 22% due to Lack of training.
- (d). A total 0% due to improper foot ware.
- (e). A total 22% due to absent-mindedness/Nervousness.

According to Rating Impact 5 (Very High):

- (a). Overexertion and physical fatigue has 22% of probability to cause an accident.
- (b). A total of 33% due to Careless actions of worker himself.
- (c). A total 22% due to Lack of training.
- (d). A total 22% due to improper foot ware.
- (e). A total 0% due to absent-mindedness/Nervousness.

4.3.4 Safety Management

This category examination shows the reactions against Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, took unsafe position or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure which are able to approve or demonstrate the member as per his experience or amplify scope. Safety Management analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions

members of participants for accidents causes due to Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, Took unsafe position or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure.

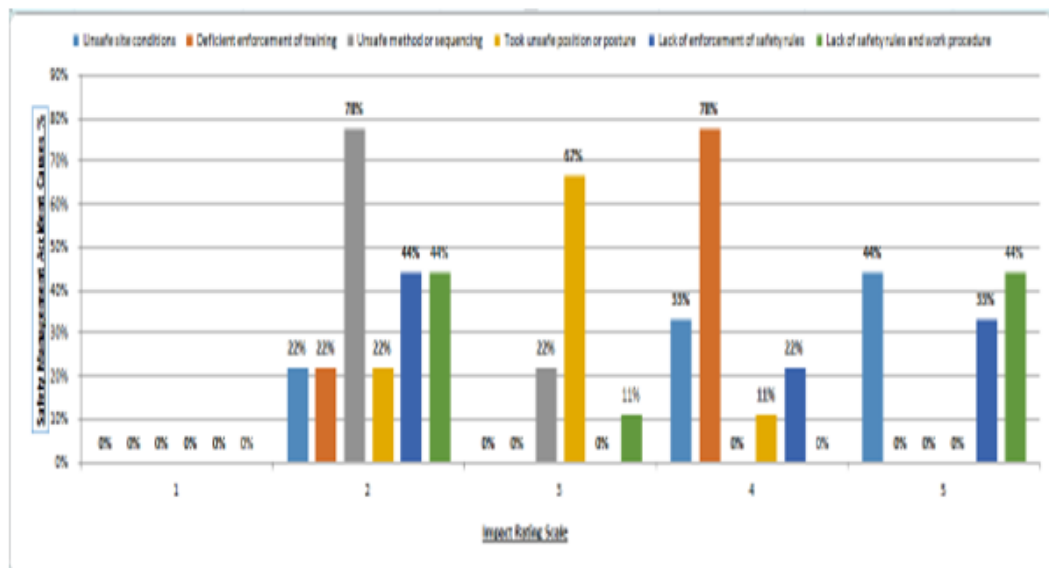


FIGURE 4.4: Rating Impact vs Causes of Accidents due to Safety Management

Corporate level members had given the following responses against the established reasons related to site condition. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Unsafe site conditions have 0% of probability to cause an accident.
- A total of 0% due to deficient enforcement of training.
- A total 0% due to unsafe method or sequencing.
- A total 0% due to unsafe position or posture.
- A total 0% due to lack of enforcement of safety rules.
- A total 0% due to lack of safety rules and work procedure.

According to Rating Impact 2 (Low):

- Unsafe site conditions has 22% of probability to cause an accident.
- A total of 22% due to deficient enforcement of training.
- A total 78% due to unsafe method or sequencing.
- A total 22% due to unsafe position or posture.
- A total 44% due to lack of enforcement of safety rules.

(f). A total 44% due to lack of safety rules and work procedure.

According to Rating Impact 3 (Medium):

(a). Unsafe site conditions has 0% of probability to cause an accident.

(b). A total of 0% due to deficient enforcement of training.

(c). A total 22% due to unsafe method or sequencing.

(d). A total 67% due to unsafe position or posture.

(e). A total 0% due to lack of enforcement of safety rules.

(f). A total 11% due to lack of safety rules and work procedure.

According to Rating Impact 4 (High):

(a). Unsafe site conditions has 33% of probability to cause an accident.

(b). A total of 78% due to deficient enforcement of training.

(c). A total 0% due to unsafe method or sequencing.

(d). A total 11% due to unsafe position or posture.

(e). A total 22% due to lack of enforcement of safety rules.

(f). A total 0% due to lack of safety rules and work procedure.

According to Rating Impact 5 (Very High):

(a). Unsafe site conditions has 44% of probability to cause an accident.

(b). A total of 0% due to deficient enforcement of training.

(c). A total 0% due to unsafe method or sequencing.

(d). A total 0% due to unsafe position or posture.

(e). A total 33% due to lack of enforcement of safety rules.

(f). A total 44% due to lack of safety rules and work procedure.

4.3.5 Equipment

This category examination shows the reactions against Faulty equipment, Misplacing objects, Defective machinery on site, Defective forklift or Other Specified Accident Cause which is able validate or indicate the participant as per his encounter or extend scope. In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to

Faulty equipment, Misplacing objects, Defective machinery on site and Defective forklift.

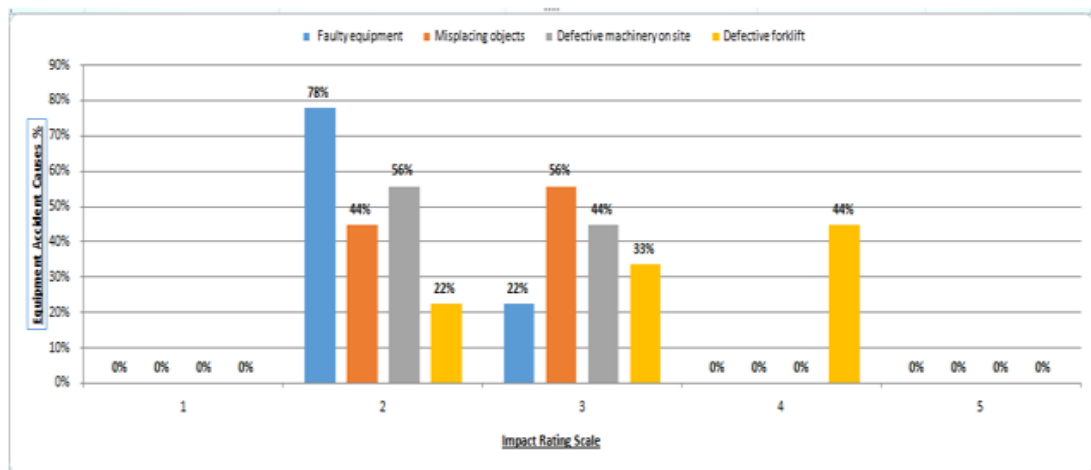


FIGURE 4.5: Rating Impact vs Causes of Accidents Due to Equipment

Corporate level members had given the following responses against the established reasons related to equipment. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Faulty equipment has 0% of probability to cause an accident.
- A total of 0% due to misplacing of objects.
- A total 0% due to defective machinery on site.
- A total 0% due to Defective forklift.

According to Rating Impact 2 (Low):

- Faulty equipment has 78% of probability to cause an accident.
- A total of 44% due to misplacing of objects.
- A total 56% due to defective machinery on site.
- A total 22% due to Defective forklift.

According to Rating Impact 3 (Medium):

- Faulty equipment has 22% of probability to cause an accident.
- A total of 56% due to misplacing of objects.
- A total 44% due to defective machinery on site.
- A total 33% due to Defective forklift.

According to Rating Impact 4 (High):

- Faulty equipment has 0% of probability to cause an accident.

- (b). A total of 0% due to misplacing of objects.
- (c). A total 0% due to defective machinery on site.
- (d). A total 44% due to Defective forklift.

According to Rating Impact 5 (Very High):

- (a). Faulty equipment has 0% of probability to cause an accident.
- (b). A total of 0% due to misplacing of objects.
- (c). A total 0% due to defective machinery on site.
- (d). A total 0% due to Defective forklift.

4.3.6 Team Issues

This category examination shows the reactions against due to Lack of team work, Inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job and Other Specified Accidents which is able validate or indicate the participant as per his encounter or extend scope. Team Issues analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Lack of team work, inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job.

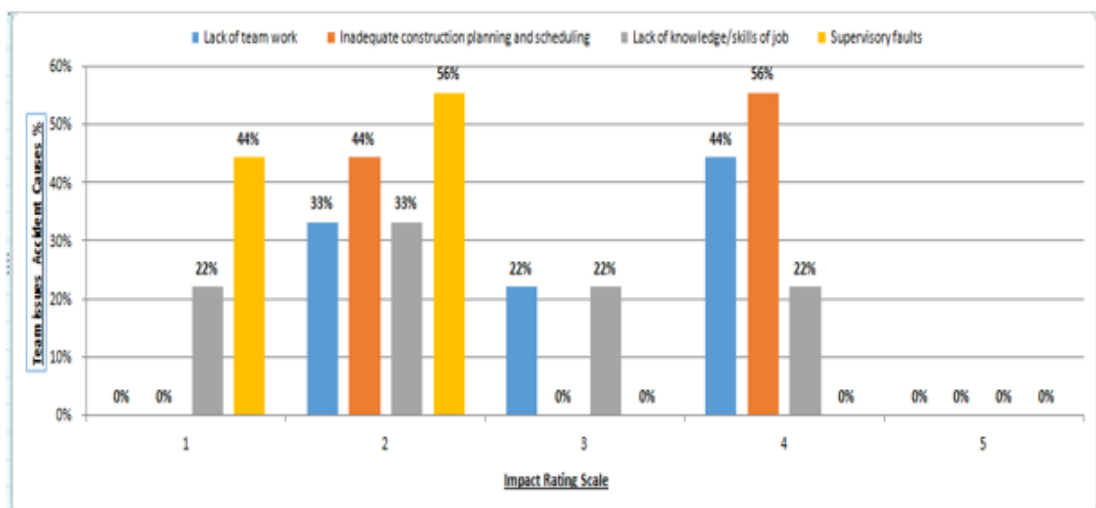


FIGURE 4.6: Rating Impact vs Causes of Accidents Due to Team Issues

Corporate level members had given the following responses against the established reasons related to team issues. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Lack of team work has 0% of probability to cause an accident.
- (b). A total of 0% due to inadequate construction planning and scheduling.
- (c). A total 22% due to supervisory faults.
- (d). A total 44% due to lack of knowledge/skills of job.

According to Rating Impact 2 (Low):

- (a). Lack of team work has 33% of probability to cause an accident.
- (b). A total of 44% due to inadequate construction planning and scheduling.
- (c). A total 33% due to supervisory faults.
- (d). A total 56% due to lack of knowledge/skills of job.

According to Rating Impact 3 (Medium):

- (a). Lack of team work has 22% of probability to cause an accident.
- (b). A total of 0% due to inadequate construction planning and scheduling.
- (c). A total 22% due to supervisory faults.
- (d). A total 0% due to lack of knowledge/skills of job.

According to Rating Impact 4 (High):

- (a). Lack of team work has 44% of probability to cause an accident.
- (b). A total of 56% due to inadequate construction planning and scheduling.
- (c). A total 22% due to supervisory faults.
- (d). A total 0% due to lack of knowledge/skills of job.

According to Rating Impact 5 (Very High):

- (a). Lack of team work has 0% of probability to cause an accident.
- (b). A total of 0% due to inadequate construction planning and scheduling.
- (c). A total 0% due to supervisory faults.
- (d). A total 0% due to lack of knowledge/skills of job.

4.3.7 Scaffolding/Ladder

This category examination shows the reactions against Scaffolding not properly installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing

damage to adjacent property, Loose bonding of scaffolding.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Scaffolding not properly installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

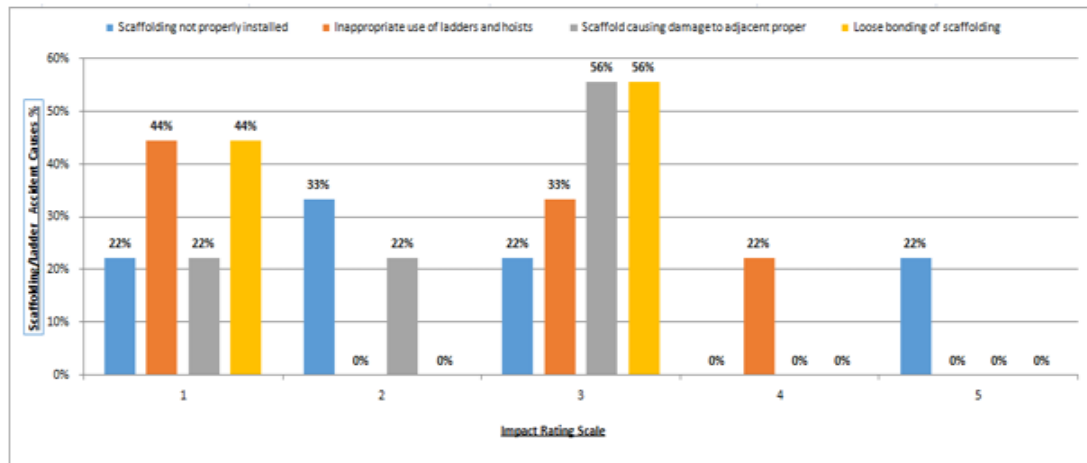


FIGURE 4.7: Rating Impact vs Causes of Accidents Due to Scaffolding/Ladder

Corporate level members had given the following responses against the established reasons related to team issues. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Scaffolding not properly installed has 22% of probability to cause an accident.
- A total of 44% due to inappropriate use of ladders and hoists.
- A total 22% due to collapse of scaffold causing damage to adjacent property.
- A total 44% due to loose bonding of scaffolding.

According to Rating Impact 2 (Low):

- Scaffolding not properly installed has 33% of probability to cause an accident.
- A total of 0% due to inappropriate use of ladders and hoists.
- A total 22% due to collapse of scaffold causing damage to adjacent property.
- A total 0% due to loose bonding of scaffolding.

According to Rating Impact 3 (Medium):

- Scaffolding not properly installed has 22% of probability to cause an accident.
- A total of 33% due to inappropriate use of ladders and hoists.

- (c). A total 56% due to collapse of scaffold causing damage to adjacent property.
 (d). A total 56% due to loose bonding of scaffolding.

According to Rating Impact 4 (High):

- (a). Scaffolding not properly installed has 0% of probability to cause an accident.
 (b). A total of 22% due to inappropriate use of ladders and hoists.
 (c). A total 0% due to collapse of scaffold causing damage to adjacent property.
 (d). A total 0% due to loose bonding of scaffolding.

According to Rating Impact 5 (Very High):

- (a). Scaffolding not properly installed has 22% of probability to cause an accident.
 (b). A total of 0% due to inappropriate use of ladders and hoists.
 (c). A total 0% due to collapse of scaffold causing damage to adjacent property.
 (d). A total 0% due to loose bonding of scaffolding.

4.3.8 Site Condition

This category examination shows the reactions against Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

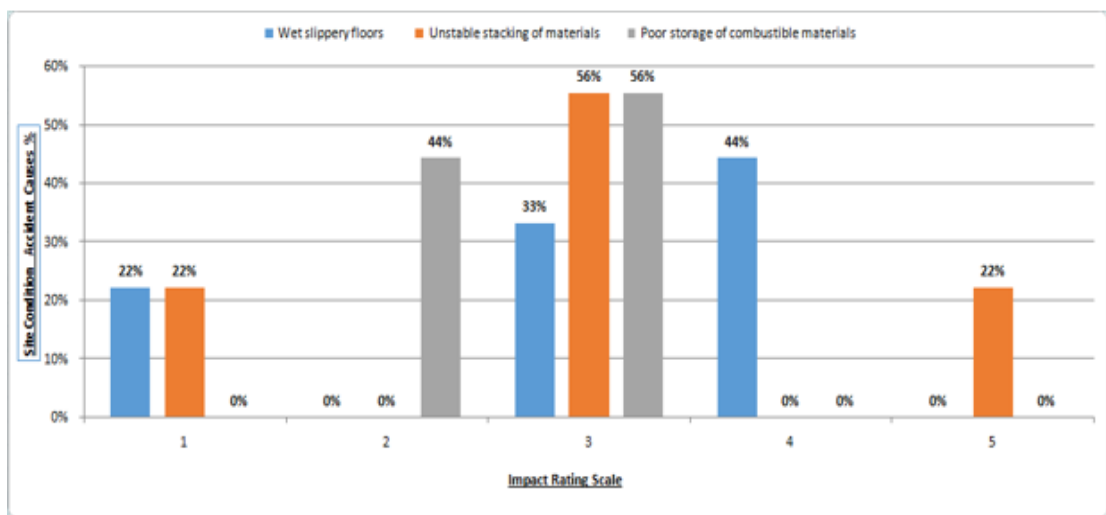


FIGURE 4.8: Rating Impact vs Causes of Accidents Due to Site Condition

Corporate level members had given the following responses against the established reasons related to team issues. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Wet slippery floors has 22% of probability to cause an accident.
- (b). A total of 22% due to unstable stacking of materials.
- (c). A total 0% due to poor storage of combustible material.

According to Rating Impact 2 (Low):

- (a). Wet slippery floors has 0% of probability to cause an accident.
- (b). A total of 0% due to unstable stacking of materials.
- (c). A total 44% due to poor storage of combustible material.

According to Rating Impact 3 (Medium):

- (a). Wet slippery floors has 22% of probability to cause an accident.
- (b). A total of 44% due to unstable stacking of materials.
- (c). A total 22% due to poor storage of combustible material.

According to Rating Impact 4 (High):

- (a). Wet slippery floors has 44% of probability to cause an accident.
- (b). A total of 0% due to unstable stacking of materials.
- (c). A total 0% due to poor storage of combustible material.

According to Rating Impact 5 (Very High):

- (a). Wet slippery floors has 0% of probability to cause an accident.
- (b). A total of 22% due to unstable stacking of materials.
- (c). A total 0% due to poor storage of combustible material.

4.3.9 Due To Fire and Explosion

This category examination shows the reactions against Fires and explosions, Trench collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Fires and explosions, Trench

collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

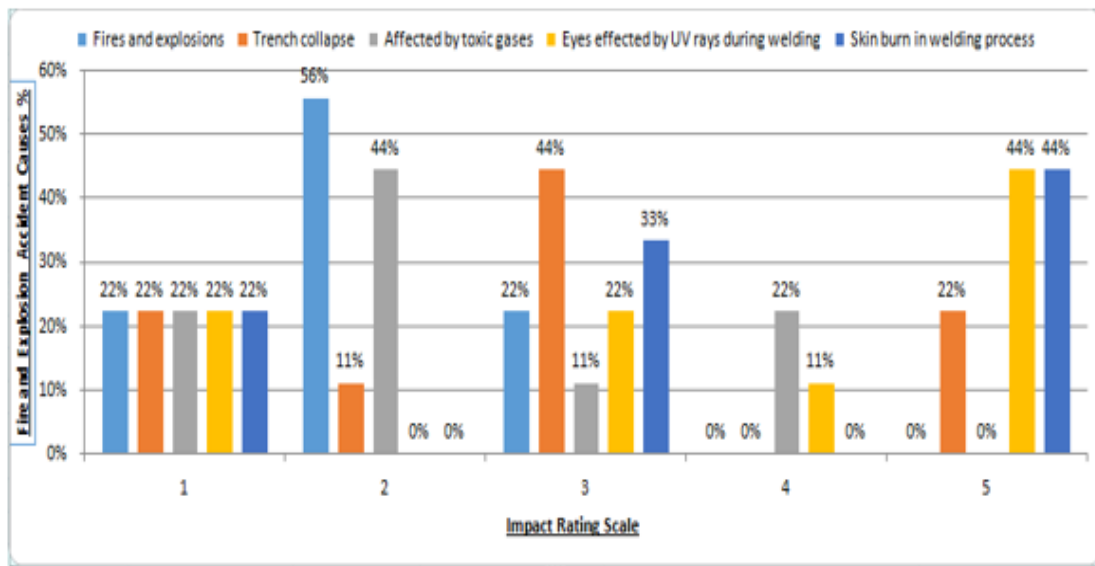


FIGURE 4.9: Rating Impact vs Causes of Accidents Due to Fire/Explosion

Corporate level members had given the following responses against the established reasons related to team issues. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Fire & Explosion has 22% of probability to cause an accident.
- (b). A total of 22% due to affected by trench collapse.
- (c). A total of 22% due to affected by toxic gases.
- (d). A total 22% due to eyes effected by UV rays during welding.
- (a). A total 22% due to skin burn in welding process.

According to Rating Impact 2 (Low):

- (a). Fire & Explosion has 56% of probability to cause an accident.
- (b). A total of 11% due to affected by trench collapse.
- (c). A total of 44% due to affected by toxic gases.
- (d). A total 0% due to eyes effected by UV rays during welding.
- (e). A total 0% due to skin burn in welding process.

According to Rating Impact 3 (Medium):

- (a). Fire & Explosion has 22% of probability to cause an accident.
- (b). A total of 44% due to affected by trench collapse.

- (c). A total of 11% due to affected by toxic gases.
- (d). A total 22% due to eyes effected by UV rays during welding.
- (e). A total 33% due to skin burn in welding process.

According to Rating Impact 4 (High):

- (a). Fire & Explosion has 0% of probability to cause an accident.
- (b). A total of 0% due to affected by trench collapse.
- (c). A total of 22% due to affected by toxic gases.
- (d). A total 11% due to eyes effected by UV rays during welding.
- (e). A total 0% due to skin burn in welding process.

According to Rating Impact 5 (Very High):

- (a). Fire & Explosion has 0% of probability to cause an accident. (b). A total of 22% due to affected by trench collapse.
- (c). A total of 0% due to affected by toxic gases.
- (d). A total 44% due to eyes effected by UV rays during welding.
- (e). A total 44% due to skin burn in welding process.

4.4 Senior Level

4.4.1 Slips and Falls

This category examination shows the reactions against Falls from heights, Slips and falls on the floor/roof, falling debris, material or objects, fall from opening or stairways which is able demonstrate or indicate the member as per his encounter or extend scope of Slips and falls.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to fall from heights, Slips and falls on the floor/roof, falling debris, material or objects.

Senior level members had given their responses against the established reasons related to Slips and falls. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

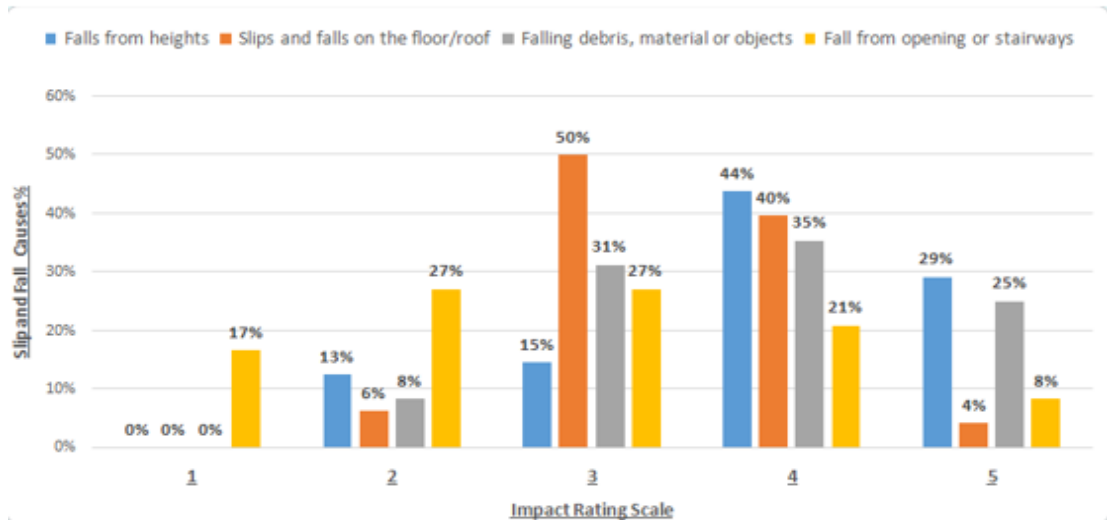


FIGURE 4.10: Rating impact vs Causes of Accidents Due to Slip and Falls

- (a). Fall from heights has 0% of probability to cause an accident.
- (b). A total of 0% due to slip and fall on the floor/roof.
- (c). A total 0% due to falling debris, material or objects.
- (d). A total 17% due to fall from opening or stairways.

According to Rating Impact 2 (Low):

- (a). Fall from heights has 13% of probability to cause an accident.
- (b). A total of 6% due to slip and fall on the floor/roof.
- (c). A total 8% due to falling debris, material or objects.
- (d). A total 27% due to fall from opening or stairways.

According to Rating Impact 3 (Medium):

- (a). Fall from heights has 15% of probability to cause an accident.
- (b). A total of 50% due to slip and fall on the floor/roof.
- (c). A total 31% due to falling debris, material or objects.
- (d). A total 27% due to fall from opening or stairways.

According to Rating Impact 4 (High):

- (a). Fall from heights has 44% of probability to cause an accident.
- (b). A total of 40% due to slip and fall on the floor/roof.
- (c). A total 35% due to falling debris, material or objects.
- (d). A total 21% due to fall from opening or stairways.

According to Rating Impact 5 (Very High):

- (a). Fall from heights has 29% of probability to cause an accident.
- (b). A total of 4% due to slip and fall on the floor/roof.
- (c). A total 25% due to falling debris, material or objects.
- (d). A total 8% due to fall from opening or stairways.

4.4.2 Machinery

This category examination shows the reactions against Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a Crane. In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a crane.

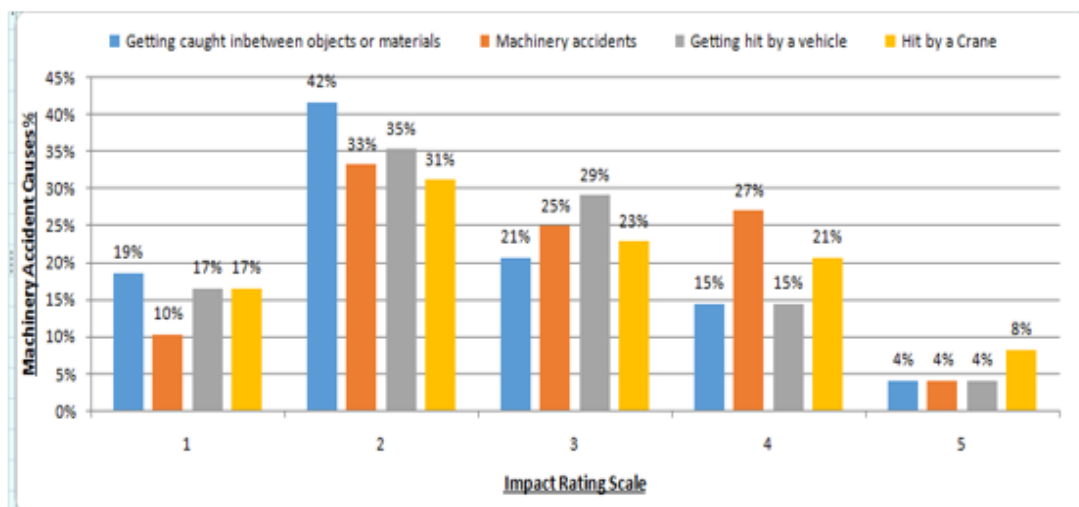


FIGURE 4.11: Rating Impact vs Causes of Accidents Due to Machinery

Senior level members had given the following responses against the established reasons related to machinery. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Getting caught in between objects or materials has 19% of probability to cause an accident.
- ((b). A total of 10% due to machinery accidents.
- (c). A total 17% due to getting hit by a vehicle.

(d). A total 17% due to hit by a crane.

According to Rating Impact 2 (Low):

(a). Getting caught in between objects or materials has 42% of probability to cause an accident.

(b). A total of 33% due to machinery accidents.

(c). A total 35% due to getting hit by a vehicle.

(d). A total 31% due to hit by a crane.

According to Rating Impact 3 (Medium):

(a). Getting caught in between objects or materials has 21% of probability to cause an accident.

(b). A total of 25% due to machinery accidents.

(c). A total 29% due to getting hit by a vehicle.

(d). A total 23% due to hit by a crane.

According to Rating Impact 4 (High):

(a). Getting caught in between objects or materials has 15% of probability to cause an accident.

(b). A total of 27% due to machinery accidents.

(c). A total 15% due to getting hit by a vehicle.

(d). A total 21% due to hit by a crane.

According to Rating Impact 5 (Very High):

(a). Getting caught in between objects or materials has 4% of probability to cause an accident.

(b). A total of 4% due to machinery accidents.

(c). A total 4% due to getting hit by a vehicle.

(d). A total 8% due to hit by a crane.

4.4.3 Labour

This category examination shows the complete aggregate of responses against Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, Improper foot ware, Absent-mindedness/Nervousness which are able approve or demonstrate the member as per his experience or amplify scope. Labour

analysis be subject to two phases

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes of Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, improper foot ware, Absent-mindedness/Nervousness.

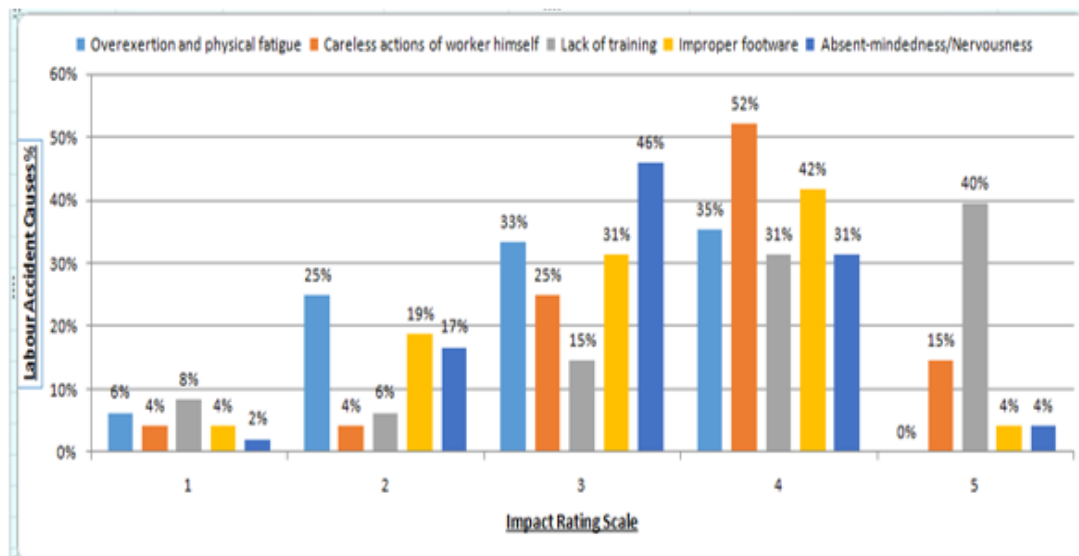


FIGURE 4.12: Rating Impact vs Causes of Accidents Due to Labour

Senior level members had given the following responses against the established reasons related to labour. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Overexertion and physical fatigue has 6% of probability to cause an accident.
- A total of 4% due to Careless actions of worker himself.
- A total 8% due to Lack of training.
- A total 4% due to improper foot ware.
- A total 2% due to absent-mindedness/Nervousness.

According to Rating Impact 2 (Low):

- Overexertion and physical fatigue has 25% of probability to cause an accident.
- A total of 4% due to Careless actions of worker himself.
- A total 6% due to Lack of training.
- A total 19% due to improper foot ware.

(e). A total 17% due to absent-mindedness/Nervousness.

According to Rating Impact 3 (Medium):

(a). Overexertion and physical fatigue has 33% of probability to cause an accident.

(b). A total of 25% due to Careless actions of worker himself.

(c). A total 15% due to Lack of training.

(d). A total 31% due to improper foot ware.

(e). A total 46% due to absent-mindedness/Nervousness.

According to Rating Impact 4 (High):

(a). Overexertion and physical fatigue has 35% of probability to cause an accident.

(b). A total of 52% due to Careless actions of worker himself.

(c). A total 31% due to Lack of training.

(d). A total 42% due to improper foot ware.

(e). A total 31% due to absent-mindedness/Nervousness.

According to Rating Impact 5 (Very High):

(a). Overexertion and physical fatigue has 0% of probability to cause an accident.

(b). A total of 15% due to Careless actions of worker himself.

(c). A total 40% due to Lack of training.

(d). A total 4% due to improper foot ware.

(e). A total 4% due to absent-mindedness/Nervousness.

4.4.4 Safety Management

This category examination shows the reactions against Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, Took unsafe position or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure which are able to approve or demonstrate the member as per his experience or amplify scope. Safety Management analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, Took unsafe position

or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure.

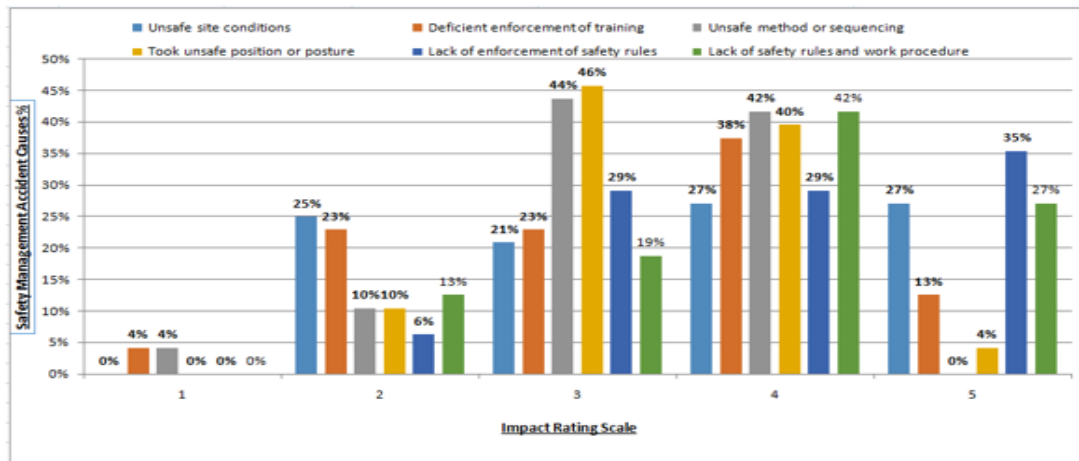


FIGURE 4.13: Rating Impact vs Causes of Accidents Due to Safety Management

Senior level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Unsafe site conditions has 0% of probability to cause an accident.
- (b). A total of 4% due to deficient enforcement of training.
- (c). A total 4% due to unsafe method or sequencing.
- (d). A total 0% due to unsafe position or posture.
- (e). A total 0% due to lack of enforcement of safety rules.
- (f). A total 0% due to lack of safety rules and work procedure.

According to Rating Impact 2 (Low):

- (a). Unsafe site conditions has 25% of probability to cause an accident.
- (b). A total of 23% due to deficient enforcement of training.
- (c). A total 10% due to unsafe method or sequencing.
- (d). A total 10% due to unsafe position or posture.
- (e). A total 6% due to lack of enforcement of safety rules.
- (f). A total 13% due to lack of safety rules and work procedure.

According to Rating Impact 3 (Medium):

- (a). Unsafe site conditions has 21% of probability to cause an accident.

- (b). A total of 23% due to deficient enforcement of training.
- (c). A total 44% due to unsafe method or sequencing.
- (d). A total 46% due to unsafe position or posture.
- (e). A total 29% due to lack of enforcement of safety rules.
- (f). A total 19% due to lack of safety rules and work procedure.

According to Rating Impact 4 (High):

- (a). Unsafe site conditions has 27% of probability to cause an accident.
- (b). A total of 38% due to deficient enforcement of training.
- (c). A total 42% due to unsafe method or sequencing.
- (d). A total 40% due to unsafe position or posture.
- (e). A total 29% due to lack of enforcement of safety rules.
- (f). A total 42% due to lack of safety rules and work procedure.

According to Rating Impact 5 (Very High):

- (a). Unsafe site conditions has 27% of probability to cause an accident.
- (b). A total of 13% due to deficient enforcement of training.
- (c). A total 0% due to unsafe method or sequencing.
- (d). A total 4% due to unsafe position or posture.
- (e). A total 35% due to lack of enforcement of safety rules.
- (f). A total 27% due to lack of safety rules and work procedure.

4.4.5 Equipment

This category examination shows the reactions against Faulty equipment, Misplacing objects, Defective machinery on site, Defective forklift or Other Specified Accident Cause which is able validate or indicate the participant as per his encounter or extend scope.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Faulty equipment, Misplacing objects, Defective machinery on site and Defective forklift.

Senior level members had given the following responses against the established reasons related to equipment. They had observed the following probabilities:

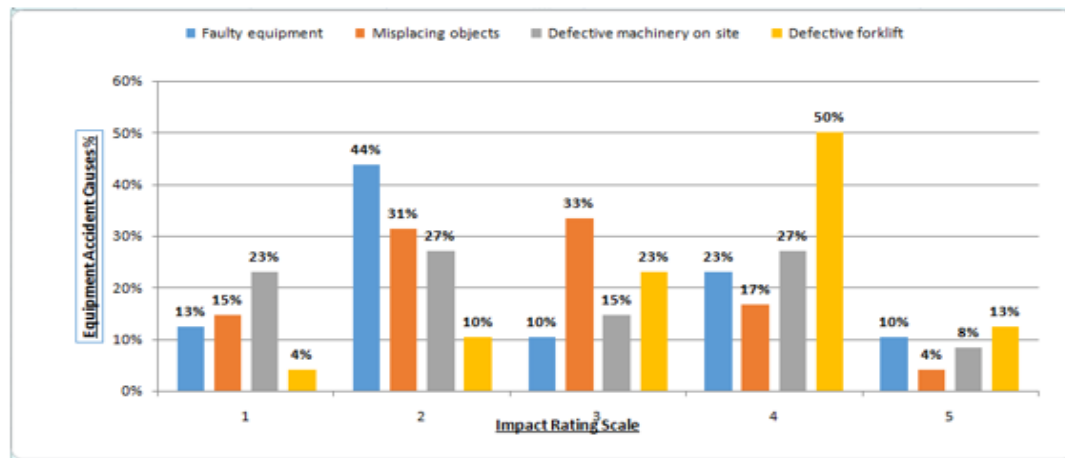


FIGURE 4.14: Rating Impact vs Causes of Accidents Due to Equipment

According to Rating Impact 1 (Very Low):

- Faulty equipment has 13% of probability to cause an accident.
- A total of 15% due to misplacing of objects.
- A total 23% due to defective machinery on site.
- A total 4% due to Defective forklift.

According to Rating Impact 2 (Low):

- Faulty equipment has 44% of probability to cause an accident.
- A total of 31% due to misplacing of objects.
- A total 27% due to defective machinery on site.
- A total 10% due to Defective forklift.

According to Rating Impact 3 (Medium):

- Faulty equipment has 10% of probability to cause an accident.
- A total of 33% due to misplacing of objects.
- A total 15% due to defective machinery on site.
- A total 23% due to Defective forklift.

According to Rating Impact 4 (High):

- Faulty equipment has 23% of probability to cause an accident.
- A total of 17% due to misplacing of objects.
- A total 27% due to defective machinery on site.
- A total 50% due to Defective forklift.

According to Rating Impact 5 (Very High):

- (a). Faulty equipment has 10% of probability to cause an accident.
- (b). A total of 4% due to misplacing of objects.
- (c). A total 8% due to defective machinery on site.
- (d). A total 13% due to Defective forklift.

4.4.6 Team Issues

This category examination shows the reactions against due to Lack of team work, Inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job and Other Specified Accidents which is able validate or indicate the participant as per his encounter or extend scope. Team Issues analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Lack of team work, inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job.

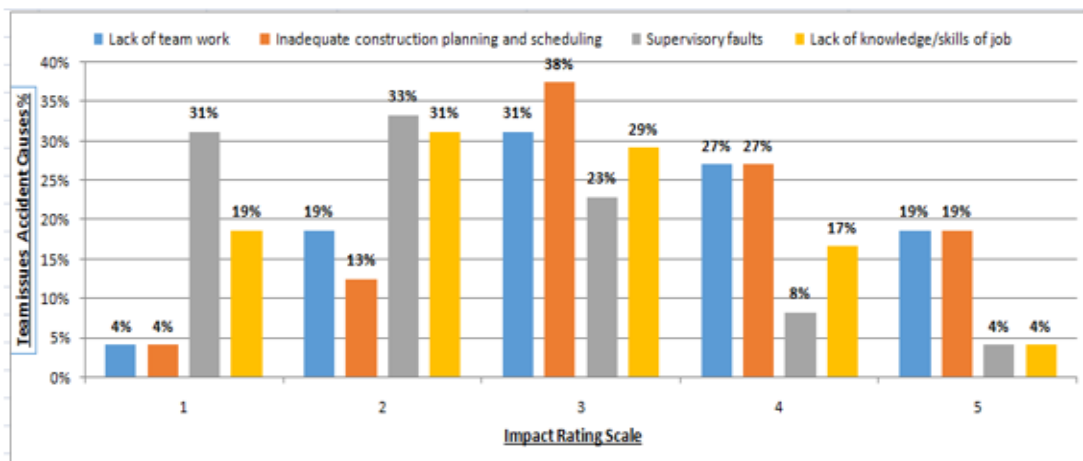


FIGURE 4.15: Rating Impact vs Causes of Accidents Due to Team Issues

Senior level members had given the following responses against the established reasons related to team issues. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Lack of team work has 4% of probability to cause an accident.

- (b). A total of 4% due to inadequate construction planning and scheduling.
- (c). A total 31% due to supervisory faults.
- (d). A total 19% due to lack of knowledge/skills of job.

According to Rating Impact 2 (Low):

- (a). Lack of team work has 19% of probability to cause an accident.
- (b). A total of 13% due to inadequate construction planning and scheduling.
- (c). A total 33% due to supervisory faults.
- (d). A total 31% due to lack of knowledge/skills of job.

According to Rating Impact 3 (Medium):

- (a). Lack of team work has 31% of probability to cause an accident.
- (b). A total of 38% due to inadequate construction planning and scheduling.
- (c). A total 23% due to supervisory faults.
- (d). A total 29% due to lack of knowledge/skills of job.

According to Rating Impact 4 (High):

- (a). Lack of team work has 27% of probability to cause an accident.
- (b). A total of 27% due to inadequate construction planning and scheduling.
- (c). A total 8% due to supervisory faults.
- (d). A total 17% due to lack of knowledge/skills of job.

According to Rating Impact 5 (Very High):

- (a). Lack of team work has 19% of probability to cause an accident.
- (b). A total of 19% due to inadequate construction planning and scheduling.
- (c). A total 4% due to supervisory faults.
- (d). A total 4% due to lack of knowledge/skills of job.

4.4.7 Scaffolding/Ladder

This category examination shows the reactions against Scaffolding not properly installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Scaffolding not properly

installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

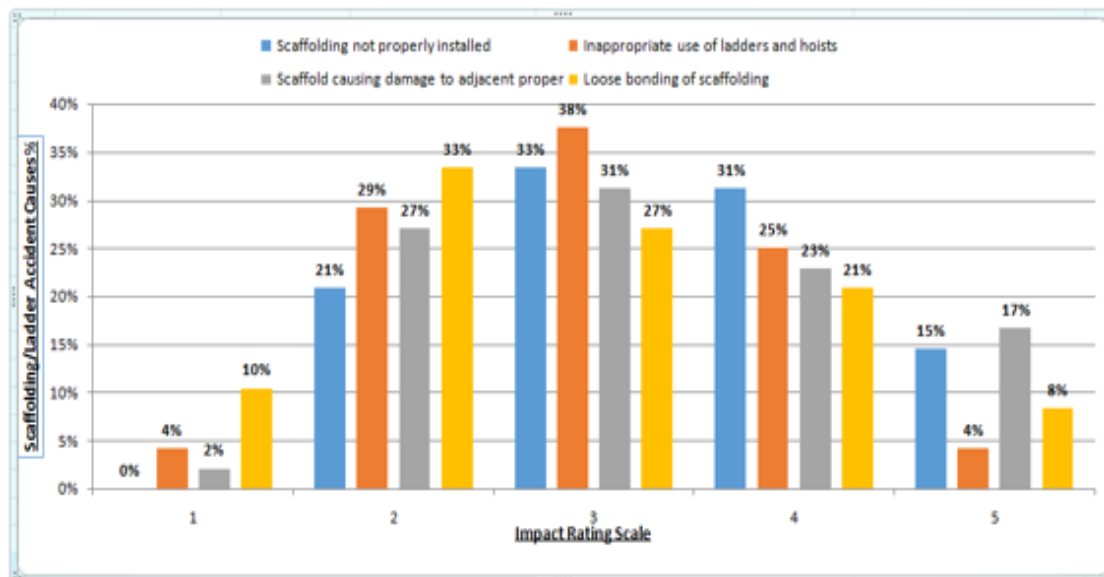


FIGURE 4.16: Rating Impact vs Causes of Accidents Due to Scaffolding/Ladder

Senior level members had given the following responses against the established reasons related to Scaffolding. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Scaffolding not properly installed has 0% of probability to cause an accident.
- A total of 4% due to inappropriate use of ladders and hoists.
- A total 2% due to collapse of scaffold causing damage to adjacent property.
- A total 10% due to loose bonding of scaffolding.

According to Rating Impact 2 (Low):

- Scaffolding not properly installed has 21% of probability to cause an accident.
- A total of 29% due to inappropriate use of ladders and hoists.
- A total 27% due to collapse of scaffold causing damage to adjacent property.
- A total 33% due to loose bonding of scaffolding.

According to Rating Impact 3 (Medium):

- Scaffolding not properly installed has 33% of probability to cause an accident.
- A total of 38% due to inappropriate use of ladders and hoists.
- A total 31% due to collapse of scaffold causing damage to adjacent property.
- A total 28% due to loose bonding of scaffolding.

According to Rating Impact 4 (High):

- (a). Scaffolding not properly installed has 31% of probability to cause an accident.
- (b). A total of 25% due to inappropriate use of ladders and hoists.
- (c). A total 23% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 21% due to loose bonding of scaffolding.

According to Rating Impact 5 (Very High):

- (a). Scaffolding not properly installed has 15% of probability to cause an accident.
- (b). A total of 4% due to inappropriate use of ladders and hoists.
- (c). A total 17% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 8% due to loose bonding of scaffolding.

4.4.8 Site Condition

This category examination shows the reactions against Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

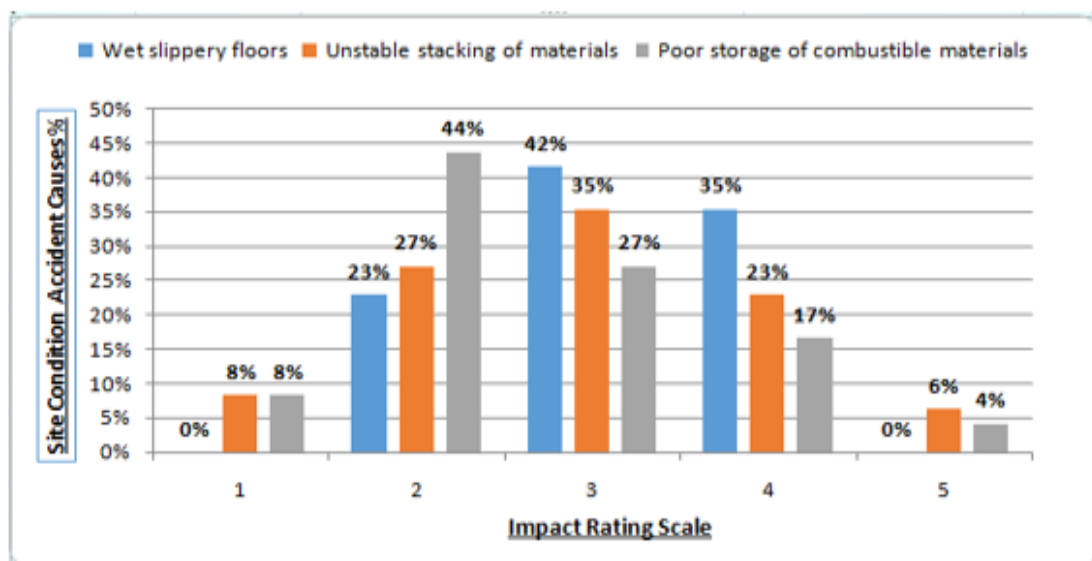


FIGURE 4.17: Rating Impact vs Causes of Accidents Due to Site Condition

Senior level members had given the following responses against the established reasons related to site condition. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Wet slippery floors has 0% of probability to cause an accident.
- (b). A total of 8% due to unstable stacking of materials.
- (c). A total 8% due to poor storage of combustible material.

According to Rating Impact 2 (Low):

- (a). Wet slippery floors has 23% of probability to cause an accident.
- (b). A total of 27% due to unstable stacking of materials.
- (c). A total 44% due to poor storage of combustible material.

According to Rating Impact 3 (Medium):

- (a). Wet slippery floors has 42% of probability to cause an accident.
- (b). A total of 35% due to unstable stacking of materials.
- (c). A total 27% due to poor storage of combustible material.

According to Rating Impact 4 (High):

- (a). Wet slippery floors has 35% of probability to cause an accident.
- (b). A total of 23% due to unstable stacking of materials.
- (c). A total 17% due to poor storage of combustible material.

According to Rating Impact 5 (Very High):

- (a). Wet slippery floors has 0% of probability to cause an accident.
- (b). A total of 6% due to unstable stacking of materials.
- (c). A total 4% due to poor storage of combustible material.

4.4.9 Due to Fire and Explosion

This category examination shows the reactions against Fires and explosions, Trench collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Fires and explosions, Trench

collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

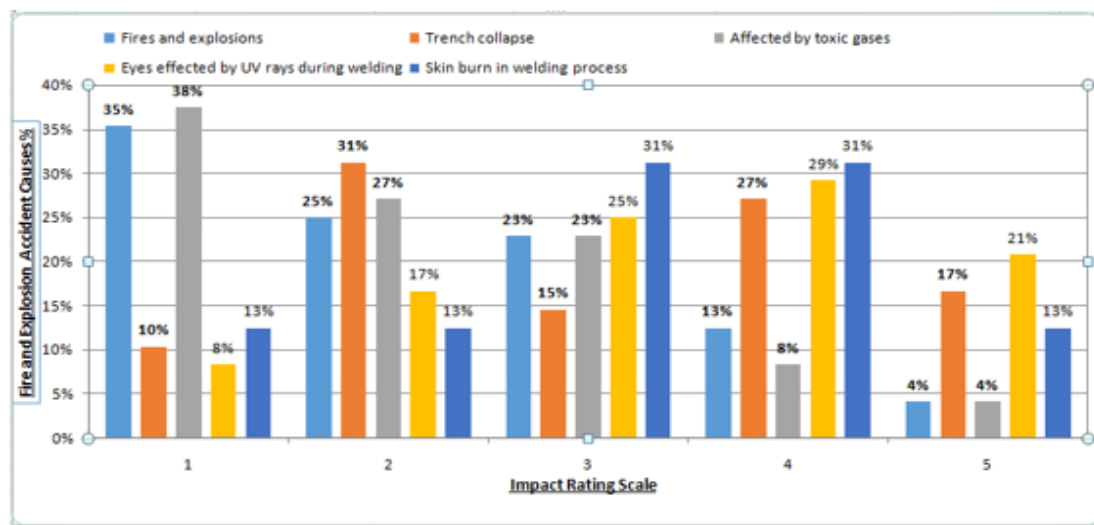


FIGURE 4.18: Rating Impact vs Causes of Accidents Due to Fire/Explosion

Senior level members had given the following responses against the established reasons related to Fire/Explosion. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Fire & Explosion has 35% of probability to cause an accident.
- (b). A total of 10% due to affected by trench collapse.
- (c). A total of 38% due to affected by toxic gases.
- (d). A total 8% due to eyes effected by UV rays during welding.
- (a). A total 13% due to skin burn in welding process.

According to Rating Impact 2 (Low):

- (a). Fire & Explosion has 25% of probability to cause an accident.
- (b). A total of 31% due to affected by trench collapse.
- (c). A total of 27% due to affected by toxic gases.
- (d). A total 17% due to eyes effected by UV rays during welding.
- (e). A total 13% due to skin burn in welding process.

According to Rating Impact 3 (Medium):

- (a). Fire & Explosion has 22% of probability to cause an accident.
- (b). A total of 44% due to affected by trench collapse.
- (c). A total of 11% due to affected by toxic gases.

(d). A total 22% due to eyes effected by UV rays during welding.

(e). A total 33% due to skin burn in welding process.

According to Rating Impact 4 (High):

(a). Fire & Explosion has 23% of probability to cause an accident.

(b). A total of 15% due to affected by trench collapse.

(c). A total of 23% due to affected by toxic gases.

(d). A total 25% due to eyes effected by UV rays during welding.

(e). A total 31% due to skin burn in welding process.

According to Rating Impact 5 (Very High):

(a). Fire & Explosion has 4% of probability to cause an accident.

(b). A total of 17% due to affected by trench collapse.

(c). A total of 4% due to affected by toxic gases.

(d). A total 21% due to eyes effected by UV rays during welding.

(e). A total 13% due to skin burn in welding process.

4.5 Intermediate Level

4.5.1 Slips and Falls

This category examination shows the reactions against Falls from heights, Slips and falls on the floor/roof, falling debris, material or objects, fall from opening or stairways which is able demonstrate or indicate the member as per his encounter or extend scope of Slips and falls.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to fall from heights, Slips and falls on the floor/roof, falling debris, material or objects.

Intermediate level members had given their responses against the established reasons related to Slips and falls. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

(a). Fall from heights has 5% of probability to cause an accident.

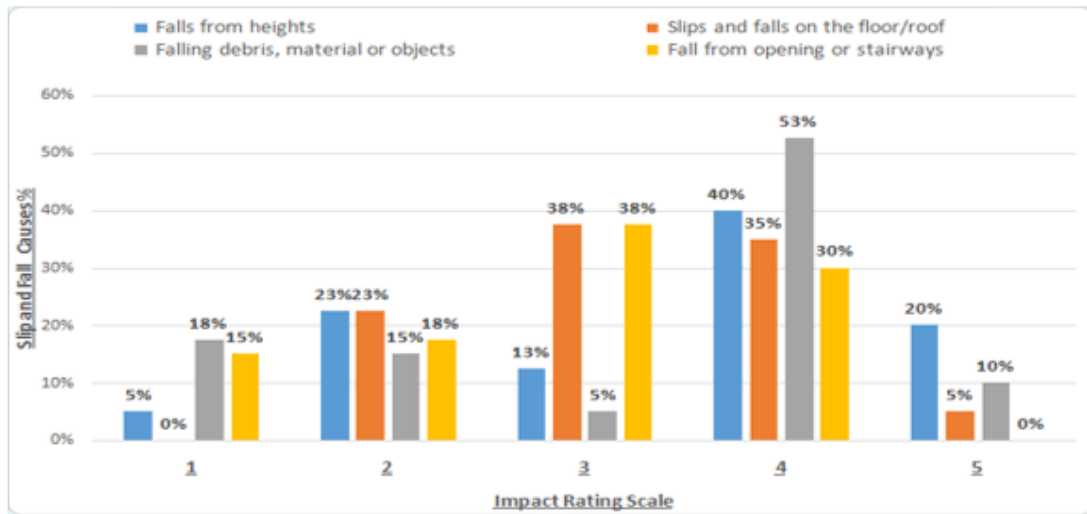


FIGURE 4.19: Rating Impact vs Causes of Accidents Due to Slip and Falls

- (b). A total of 0% due to slip and fall on the floor/roof.
- (c). A total 18% due to falling debris, material or objects.
- (d). A total 15% due to fall from opening or stairways.

According to Rating Impact 2 (Low):

- (a). Fall from heights has 23% of probability to cause an accident.
- (b). A total of 23% due to slip and fall on the floor/roof.
- (c). A total 15% due to falling debris, material or objects.
- (d). A total 18% due to fall from opening or stairways.

According to Rating Impact 3 (Medium):

- (a). Fall from heights has 13% of probability to cause an accident.
- (b). A total of 38% due to slip and fall on the floor/roof.
- (c). A total 5% due to falling debris, material or objects.
- (d). A total 38% due to fall from opening or stairways.

According to Rating Impact 4 (High):

- (a). Fall from heights has 40% of probability to cause an accident.
- (b). A total of 35% due to slip and fall on the floor/roof.
- (c). A total 53% due to falling debris, material or objects.
- (d). A total 30% due to fall from opening or stairways.

According to Rating Impact 5 (Very High):

- (a). Fall from heights has 20% of probability to cause an accident.

- (b). A total of 5% due to slip and fall on the floor/roof.
- (c). A total 10% due to falling debris, material or objects.
- (d). A total 0% due to fall from opening or stairways.

4.5.2 Machinery

This category examination shows the reactions against Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a Crane. In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a crane.

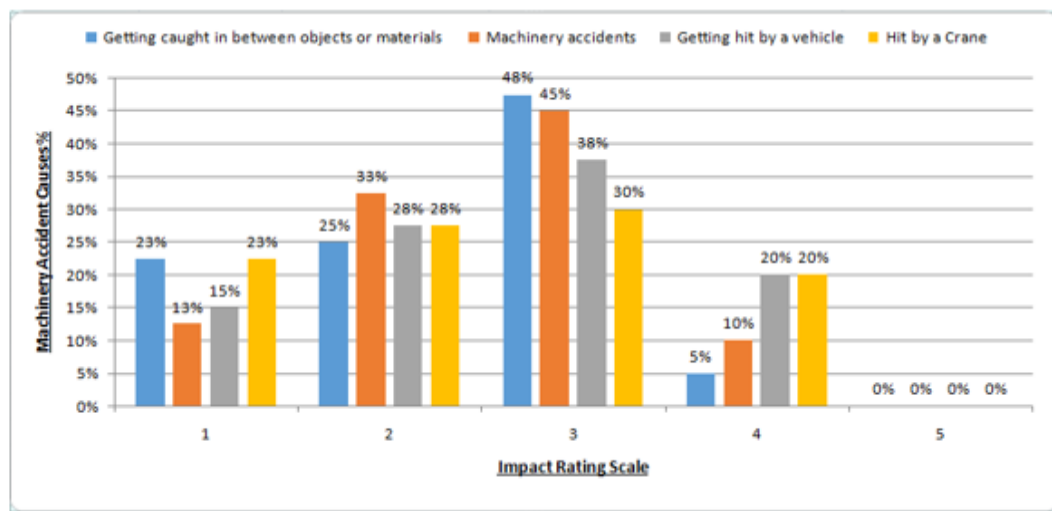


FIGURE 4.20: Rating Impact vs Causes of Accidents Due to Machinery

Intermediate level members had given the following responses against the established reasons related to machinery. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Getting caught in between objects or materials has 23% of probability to cause an accident.
- (b). A total of 13% due to machinery accidents.
- (c). A total 15% due to getting hit by a vehicle.
- (d). A total 23% due to hit by a crane.

According to Rating Impact 2 (Low):

- (a). Getting caught in between objects or materials has 25% of probability to cause an accident.
- (b). A total of 33% due to machinery accidents.
- (c). A total 28% due to getting hit by a vehicle.
- (d). A total 28% due to hit by a crane.

According to Rating Impact 3 (Medium):

- (a). Getting caught in between objects or materials has 48% of probability to cause an accident.
- (b). A total of 45% due to machinery accidents.
- (c). A total 38% due to getting hit by a vehicle.
- (d). A total 30% due to hit by a crane.

According to Rating Impact 4 (High):

- (a). Getting caught in between objects or materials has 5% of probability to cause an accident.
- (b). A total of 10% due to machinery accidents.
- (c). A total 20% due to getting hit by a vehicle.
- (d). A total 20% due to hit by a crane.

According to Rating Impact 5 (Very High):

- (a). Getting caught in between objects or materials has 0% of probability to cause an accident.
- (b). A total of 0% due to machinery accidents.
- (c). A total 0% due to getting hit by a vehicle.
- (d). A total 0% due to hit by a crane.

4.5.3 Labour

This category examination shows the complete aggregate of responses against Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, Improper foot ware, Absent-mindedness/Nervousness which are able approve or demonstrate the member as per his experience or amplify scope. Labour analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes of Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, improper foot ware, Absent-mindedness/Nervousness.

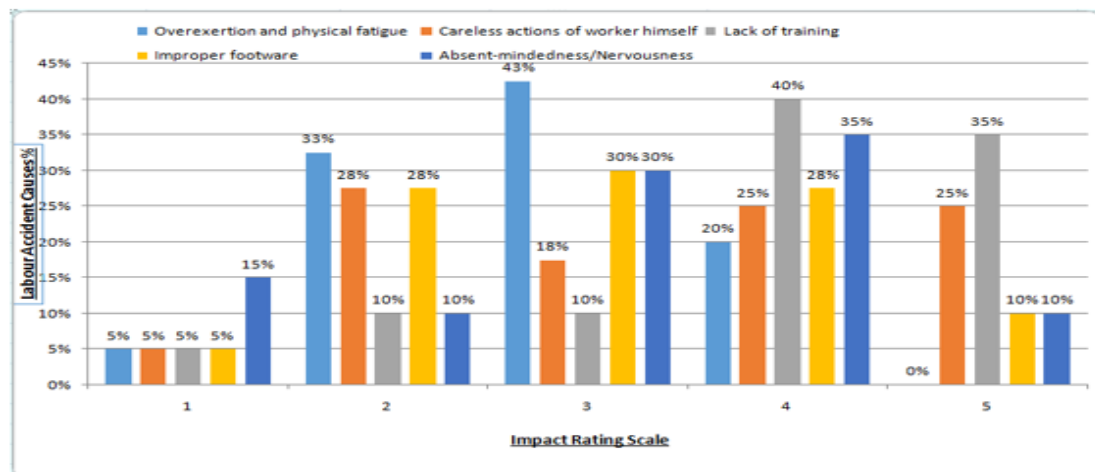


FIGURE 4.21: Rating Impact vs Causes of Accidents Due to Labour

Intermediate level members had given the following responses against the established reasons related to labour. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Overexertion and physical fatigue has 5% of probability to cause an accident.
- A total of 5% due to Careless actions of worker himself.
- A total 5% due to Lack of training.
- A total 5% due to improper foot ware.
- A total 15% due to absent-mindedness/Nervousness.

According to Rating Impact 2 (Low):

- Overexertion and physical fatigue has 33% of probability to cause an accident.
- A total of 28% due to Careless actions of worker himself.
- A total 10% due to Lack of training.
- A total 28% due to improper foot ware.
- A total 10% due to absent-mindedness/Nervousness.

According to Rating Impact 3 (Medium):

- Overexertion and physical fatigue has 43% of probability to cause an accident.

- (b). A total of 18% due to Careless actions of worker himself.
- (c). A total 10% due to Lack of training.
- (d). A total 30% due to improper foot ware.
- (e). A total 30% due to absent-mindedness/Nervousness.

According to Rating Impact 4 (High):

- (a). Overexertion and physical fatigue has 20% of probability to cause an accident.
- (b). A total of 25% due to Careless actions of worker himself.
- (c). A total 40% due to Lack of training.
- (d). A total 28% due to improper foot ware.
- (e). A total 35% due to absent-mindedness/Nervousness.

According to Rating Impact 5 (Very High):

- (a). Overexertion and physical fatigue has 0% of probability to cause an accident.
- (b). A total of 25% due to Careless actions of worker himself.
- (c). A total 35% due to Lack of training.
- (d). A total 10% due to improper foot ware.
- (e). A total 10% due to absent-mindedness/Nervousness.

4.5.4 Safety Management

This category examination shows the reactions against Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, took unsafe position or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure which are able to approve or demonstrate the member as per his experience or amplify scope. Safety Management analysis be subject to two phases.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, Took unsafe position or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure.

Intermediate level members had given the following responses against the established reasons related to safety management. They had observed the following

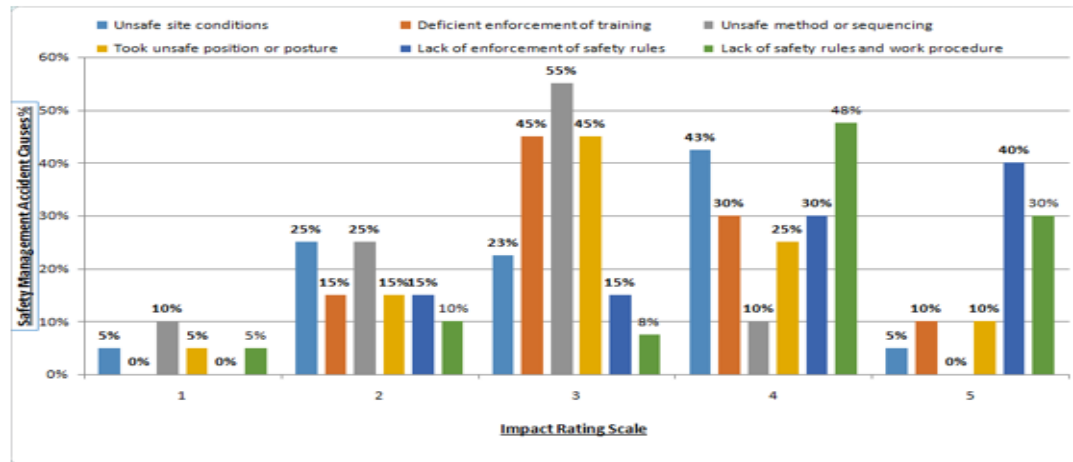


FIGURE 4.22: Rating Impact vs Causes of Accidents Due to Safety Management

probabilities:

According to Rating Impact 1 (Very Low):

- Unsafe site conditions has 5% of probability to cause an accident.
- A total of 0% due to deficient enforcement of training.
- A total 10% due to unsafe method or sequencing.
- A total 5% due to unsafe position or posture.
- A total 0% due to lack of enforcement of safety rules.
- A total 5% due to lack of safety rules and work procedure.

According to Rating Impact 2 (Low):

- Unsafe site conditions has 25% of probability to cause an accident.
- A total of 15% due to deficient enforcement of training.
- A total 25% due to unsafe method or sequencing.
- A total 15% due to unsafe position or posture.
- A total 15% due to lack of enforcement of safety rules.
- A total 10% due to lack of safety rules and work procedure.

According to Rating Impact 3 (Medium):

- Unsafe site conditions has 23% of probability to cause an accident.
- A total of 45% due to deficient enforcement of training.
- A total 55% due to unsafe method or sequencing.
- A total 45% due to unsafe position or posture.
- A total 15% due to lack of enforcement of safety rules.

(f). A total 8% due to lack of safety rules and work procedure.

According to Rating Impact 4 (High):

(a). Unsafe site conditions has 43% of probability to cause an accident.

(b). A total of 30% due to deficient enforcement of training.

(c). A total 10% due to unsafe method or sequencing.

(d). A total 25% due to unsafe position or posture.

(e). A total 30% due to lack of enforcement of safety rules.

(f). A total 48% due to lack of safety rules and work procedure.

According to Rating Impact 5 (Very High):

(a). Unsafe site conditions has 5% of probability to cause an accident.

(b). A total of 10% due to deficient enforcement of training.

(c). A total 0% due to unsafe method or sequencing.

(d). A total 10% due to unsafe position or posture.

(e). A total 40% due to lack of enforcement of safety rules.

(f). A total 30% due to lack of safety rules and work procedure.

4.5.5 Equipments

This category examination shows the reactions against Faulty equipment, Misplacing objects, Defective machinery on site, Defective forklift or Other Specified Accident Cause which is able validate or indicate the participant as per his encounter or extend scope.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Faulty equipment, Misplacing objects, Defective machinery on site and Defective forklift.

Intermediate level members had given the following responses against the established reasons related to Scaffolding. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

(a). Faulty equipment has 18% of probability to cause an accident.

(b). A total of 10% due to misplacing of objects.

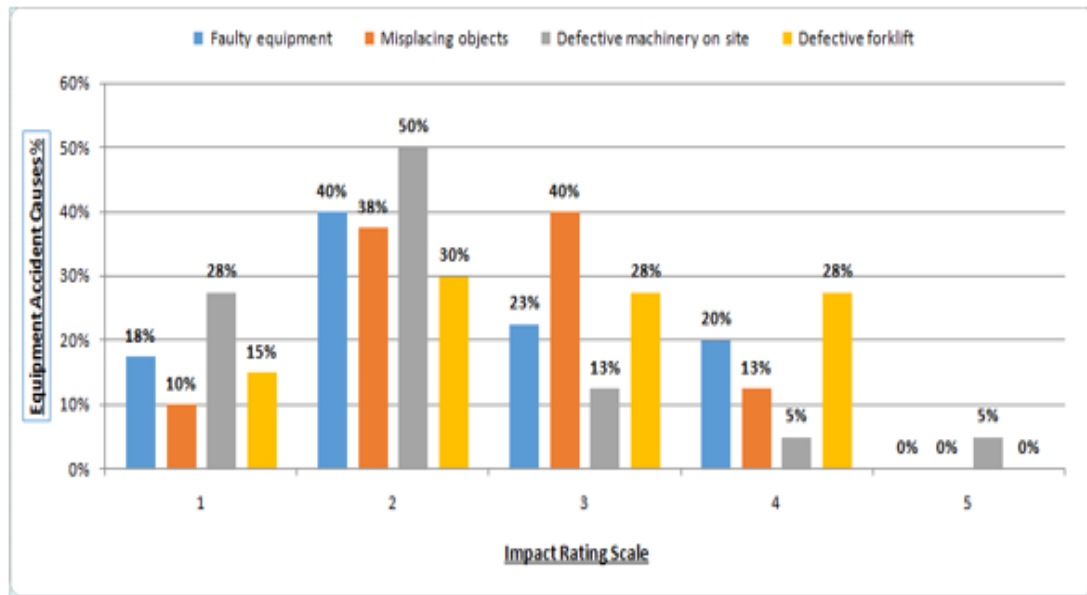


FIGURE 4.23: Rating Impact vs Causes of Accidents Due to Equipment

(c). A total 28% due to defective machinery on site.

(d). A total 15% due to Defective forklift.

According to Rating Impact 2 (Low):

(a). Faulty equipment has 40% of probability to cause an accident.

(b). A total of 38% due to misplacing of objects.

(c). A total 50% due to defective machinery on site.

(d). A total 30% due to Defective forklift.

According to Rating Impact 3 (Medium):

(a). Faulty equipment has 23% of probability to cause an accident.

(b). A total of 40% due to misplacing of objects.

(c). A total 13% due to defective machinery on site.

(d). A total 28% due to Defective forklift.

According to Rating Impact 4 (High):

(a). Faulty equipment has 20% of probability to cause an accident.

(b). A total of 13% due to misplacing of objects.

(c). A total 5% due to defective machinery on site.

(d). A total 28% due to Defective forklift.

According to Rating Impact 5 (Very High):

(a). Faulty equipment has 0% of probability to cause an accident.

- (b). A total of 0% due to misplacing of objects.
- (c). A total 5% due to defective machinery on site.
- (d). A total 0% due to Defective forklift.

4.5.6 Team Issues

This category examination shows the reactions against due to Lack of team work, Inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job and Other Specified Accidents which is able validate or indicate the participant as per his encounter or extend scope. Team Issues analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Lack of team work, inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job.

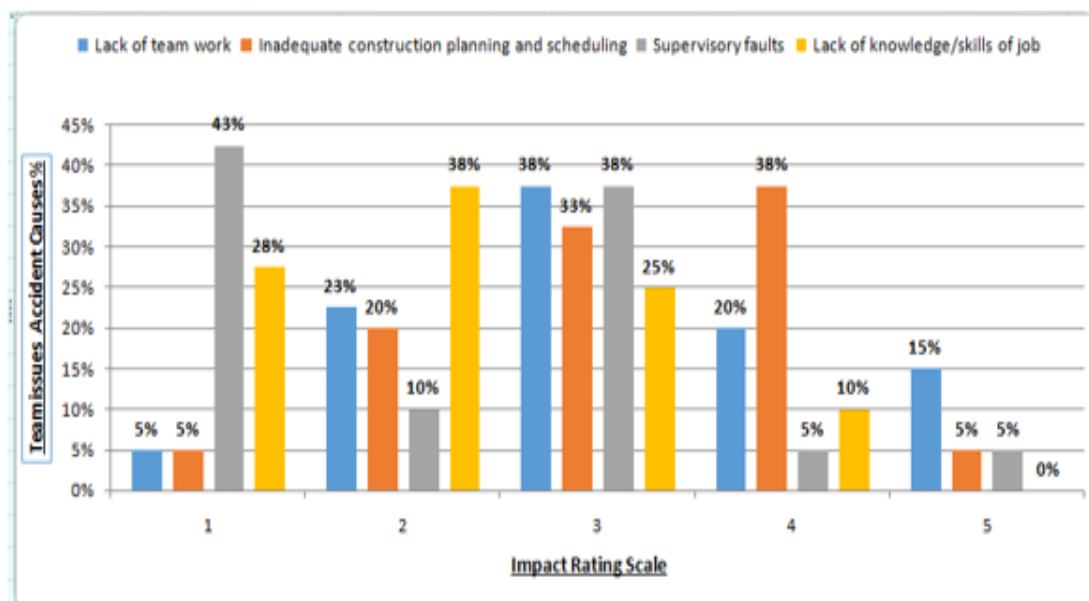


FIGURE 4.24: Rating Impact vs Causes of Accidents Due to Team Issues

Intermediate level members had given the following responses against the established reasons related to team issues. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Lack of team work has 5% of probability to cause an accident.
- (b). A total of 5% due to inadequate construction planning and scheduling.
- (c). A total 43% due to supervisory faults.
- (d). A total 28% due to lack of knowledge/skills of job.

According to Rating Impact 2 (Low):

- (a). Lack of team work has 23% of probability to cause an accident.
- (b). A total of 20% due to inadequate construction planning and scheduling.
- (c). A total 10% due to supervisory faults.
- (d). A total 38% due to lack of knowledge/skills of job.

According to Rating Impact 3 (Medium):

- (a). Lack of team work has 38% of probability to cause an accident.
- (b). A total of 33% due to inadequate construction planning and scheduling.
- (c). A total 38% due to supervisory faults.
- (d). A total 25% due to lack of knowledge/skills of job.

According to Rating Impact 4 (High):

- (a). Lack of team work has 20% of probability to cause an accident.
- (b). A total of 38% due to inadequate construction planning and scheduling.
- (c). A total 5% due to supervisory faults.
- (d). A total 10% due to lack of knowledge/skills of job.

According to Rating Impact 5 (Very High):

- (a). Lack of team work has 15% of probability to cause an accident.
- (b). A total of 5% due to inadequate construction planning and scheduling.
- (c). A total 5% due to supervisory faults.
- (d). A total 0% due to lack of knowledge/skills of job.

4.5.7 Scaffolding/Ladder

This category examination shows the reactions against Scaffolding not properly installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Scaffolding not properly installed.

Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

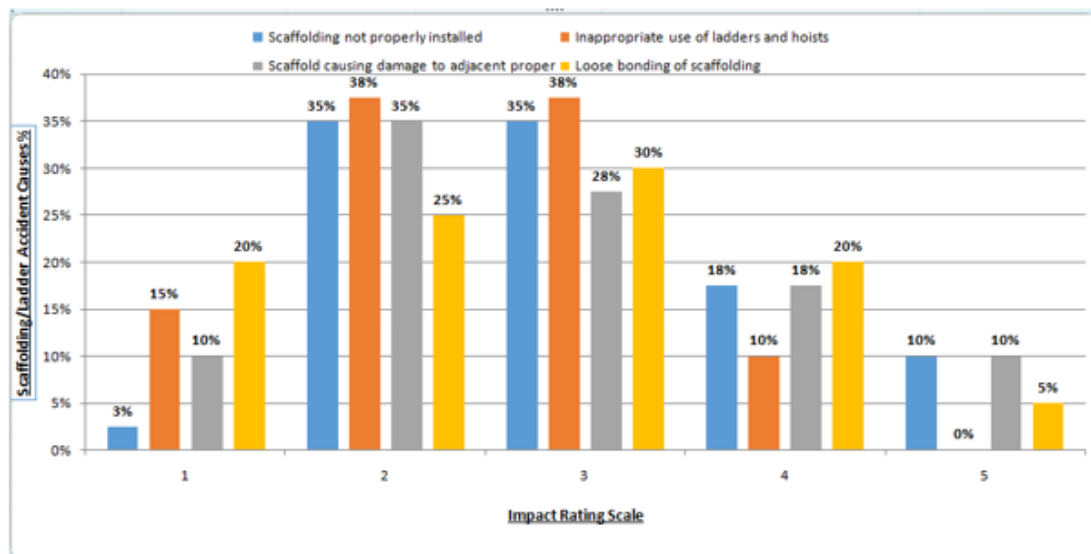


FIGURE 4.25: Rating Impact vs Causes of Accidents Due to Scaffolding/Ladder

Intermediate level members had given the following responses against the established reasons related to Scaffolding. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Scaffolding not properly installed has 3% of probability to cause an accident.
- A total of 15% due to inappropriate use of ladders and hoists.
- A total 10% due to collapse of scaffold causing damage to adjacent property.
- A total 20% due to lose bonding of scaffolding.

According to Rating Impact 2 (Low):

- Scaffolding not properly installed has 35% of probability to cause an accident.
- A total of 38% due to inappropriate use of ladders and hoists.
- A total 35% due to collapse of scaffold causing damage to adjacent property.
- A total 25% due to lose bonding of scaffolding.

According to Rating Impact 3 (Medium):

- (a). Scaffolding not properly installed has 35% of probability to cause an accident.
- (b). A total of 38% due to inappropriate use of ladders and hoists.
- (c). A total 28% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 30% due to loose bonding of scaffolding.

According to Rating Impact 4 (High):

- (a). Scaffolding not properly installed has 18% of probability to cause an accident.
- (b). A total of 10% due to inappropriate use of ladders and hoists.
- (c). A total 18% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 20% due to loose bonding of scaffolding.

According to Rating Impact 5 (Very High):

- (a). Scaffolding not properly installed has 10% of probability to cause an accident.
- (b). A total of 0% due to inappropriate use of ladders and hoists.
- (c). A total 10% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 5% due to loose bonding of scaffolding.

4.5.8 Site Condition

This category examination shows the reactions against Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

Intermediate level members had given the following responses against the established reasons related to site condition. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Wet slippery floors has 8% of probability to cause an accident.
- (b). A total of 10% due to unstable stacking of materials.
- (c). A total 20% due to poor storage of combustible material.

According to Rating Impact 2 (Low):

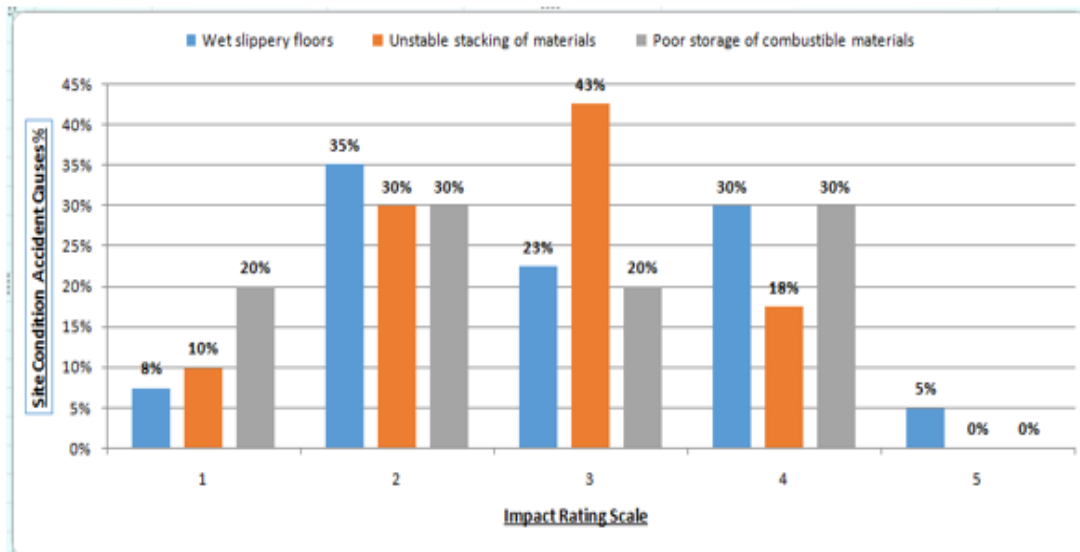


FIGURE 4.26: Rating Impact vs Causes of Accidents Due to Site Condition

- (a). Wet slippery floors has 35% of probability to cause an accident.
- (b). A total of 30% due to unstable stacking of materials.
- (c). A total 30% due to poor storage of combustible material.

According to Rating Impact 3 (Medium):

- (a). Wet slippery floors has 23% of probability to cause an accident.
- (b). A total of 43% due to unstable stacking of materials.
- (c). A total 20% due to poor storage of combustible material.

According to Rating Impact 4 (High):

- (a). Wet slippery floors have 30% of probability to cause an accident.
- (b). A total of 18% due to unstable stacking of materials.
- (c). A total 30% due to poor storage of combustible material.

According to Rating Impact 5 (Very High):

- (a). Wet slippery floors has 5% of probability to cause an accident.
- (b). A total of 0% due to unstable stacking of materials.
- (c). A total 0% due to poor storage of combustible material.

4.5.9 Due to Fire and Explosion

This category examination shows the reactions against Fires and explosions, Trench collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin

burn in welding process.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Fires and explosions, Trench collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

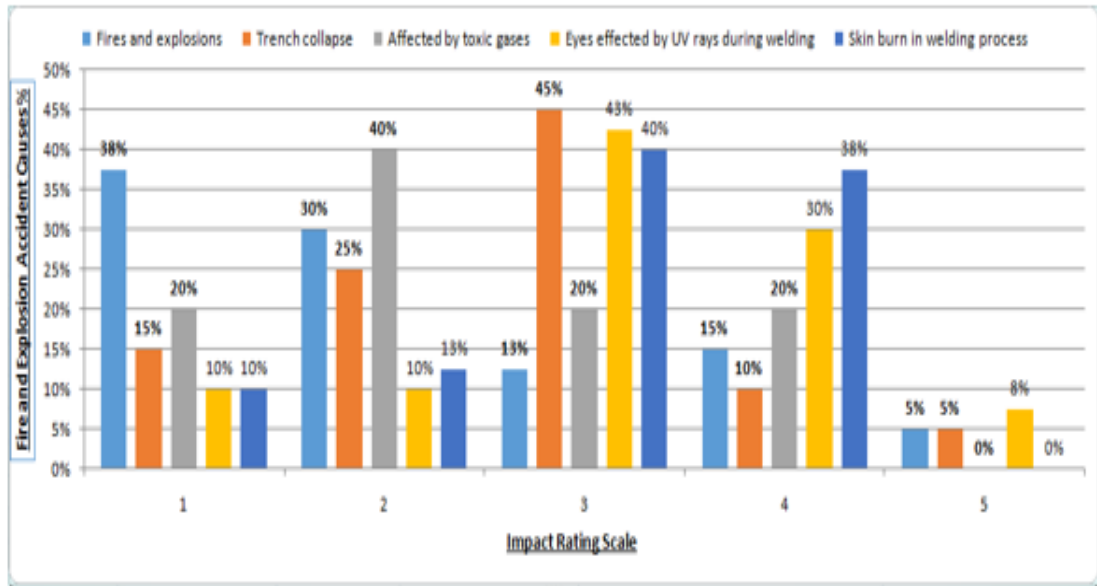


FIGURE 4.27: Rating Impact vs Causes of Accidents Due to Fire/Explosion

Intermediate level members had given the following responses against the established reasons related to Fire/Explosion. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Fire & Explosion has 38% of probability to cause an accident.
- (b). A total of 15% due to affected by trench collapse.
- (c). A total of 20% due to affected by toxic gases.
- (d). A total 10% due to eyes effected by UV rays during welding.
- (e). A total 10% due to skin burn in welding process.

According to Rating Impact 2 (Low):

- (a). Fire & Explosion has 30% of probability to cause an accident.
- (b). A total of 25% due to affected by trench collapse.
- (c). A total of 40% due to affected by toxic gases.

(d). A total 10% due to eyes effected by UV rays during welding.

(e). A total 13% due to skin burn in welding process.

According to Rating Impact 3 (Medium):

(a). Fire & Explosion has 13% of probability to cause an accident.

(b). A total of 45% due to affected by trench collapse.

(c). A total of 20% due to affected by toxic gases.

(d). A total 43% due to eyes effected by UV rays during welding.

(e). A total 40% due to skin burn in welding process.

According to Rating Impact 4 (High):

(a). Fire & Explosion has 15% of probability to cause an accident.

(b). A total of 10% due to affected by trench collapse.

(c). A total of 20% due to affected by toxic gases.

(d). A total 30% due to eyes effected by UV rays during welding.

(e). A total 38% due to skin burn in welding process.

According to Rating Impact 5 (Very High):

(a). Fire & Explosion has 5% of probability to cause an accident.

(b). A total of 5% due to affected by trench collapse.

(c). A total of 0% due to affected by toxic gases.

(d). A total 8% due to eyes effected by UV rays during welding.

(e). A total 0% due to skin burn in welding process.

4.6 Field Level

4.6.1 Slips and Falls

This category examination shows the reactions against Falls from heights, Slips and falls on the floor/roof, falling debris, material or objects, fall from opening or stairways which is able demonstrate or indicate the member as per his encounter or extend scope of Slips and falls.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions

members of participants for accidents causes due to fall from heights, Slips and falls on the floor/roof, falling debris, material or objects.

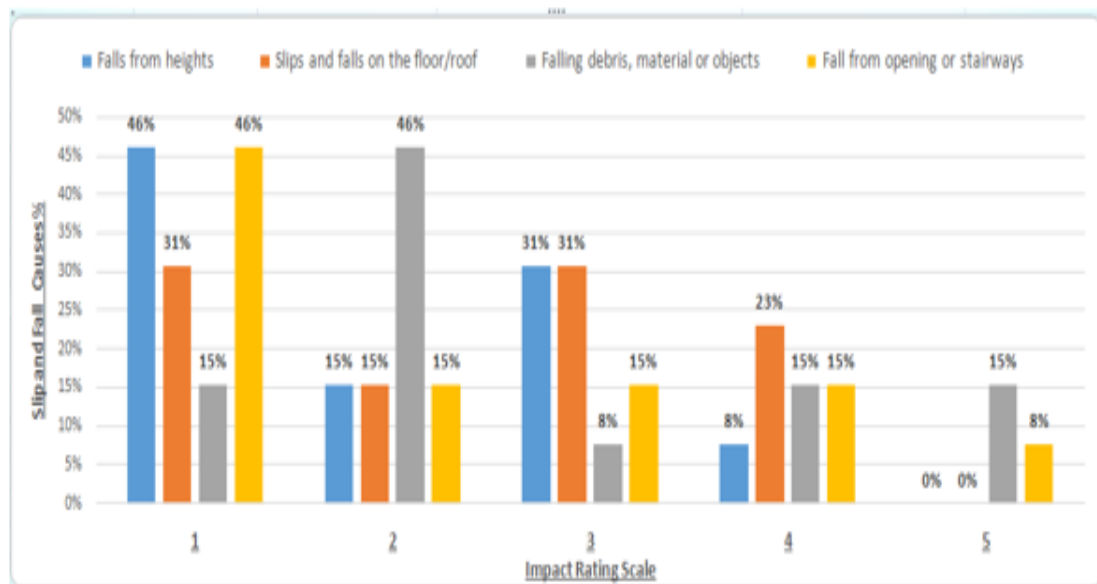


FIGURE 4.28: Rating Impact vs Causes of Accidents Due to Slip and Fall

Field level members had given their responses against the established reasons related to Slips and falls. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Fall from heights has 46% of probability to cause an accident.
- A total of 31% due to slip and fall on the floor/roof.
- A total 15% due to falling debris, material or objects.
- A total 46% due to fall from opening or stairways.

According to Rating Impact 2 (Low):

- Fall from heights has 15% of probability to cause an accident.
- A total of 15% due to slip and fall on the floor/roof.
- A total 46% due to falling debris, material or objects.
- A total 15% due to fall from opening or stairways.

According to Rating Impact 3 (Medium):

- Fall from heights has 31% of probability to cause an accident.
- A total of 31% due to slip and fall on the floor/roof.
- A total 8% due to falling debris, material or objects.
- A total 15% due to fall from opening or stairways.

According to Rating Impact 4 (High):

- (a). Fall from heights has 8% of probability to cause an accident.
- (b). A total of 23% due to slip and fall on the floor/roof.
- (c). A total 15% due to falling debris, material or objects.
- (d). A total 15% due to fall from opening or stairways.

According to Rating Impact 5 (Very High):

- (a). Fall from heights has 0% of probability to cause an accident.
- (b). A total of 0% due to slip and fall on the floor/roof.
- (c). A total 15% due to falling debris, material or objects.
- (d). A total 8% due to fall from opening or stairways.

4.6.2 Machinery

This category examination shows the reactions against Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a Crane. In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Getting caught in between objects or materials, Machinery accidents, Getting hit by a vehicle, Hit by a crane.

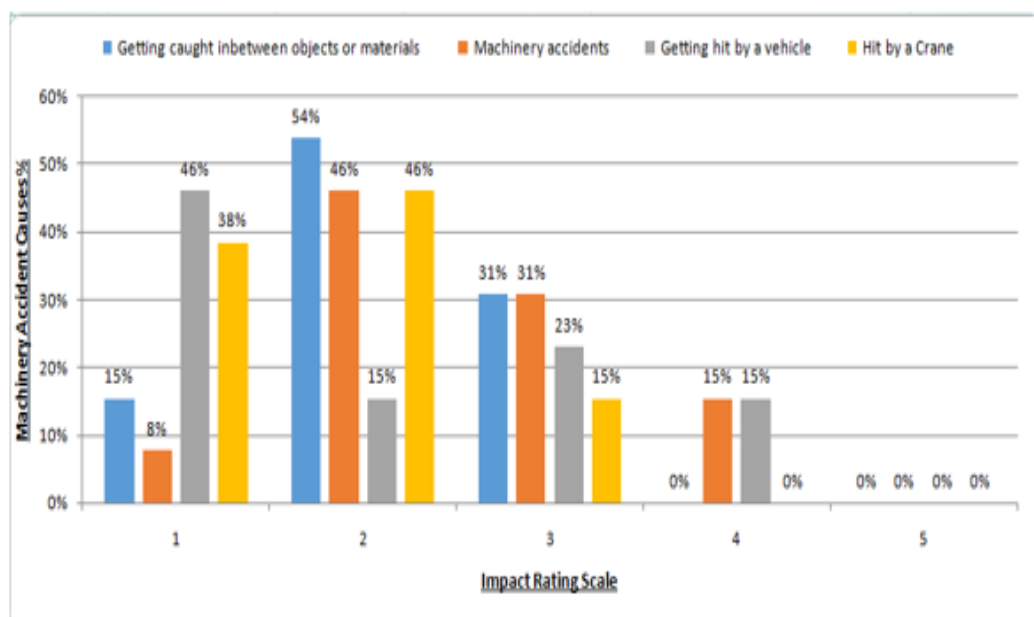


FIGURE 4.29: Rating Impact vs Causes of Accidents Due to Machinery

Field level members had given the following responses against the established reasons related to machinery. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Getting caught in between objects or materials has 15% of probability to cause an accident.
- (b). A total of 8% due to machinery accidents.
- (c). A total 46% due to getting hit by a vehicle.
- (d). A total 38% due to hit by a crane.

According to Rating Impact 2 (Low):

- (a). Getting caught in between objects or materials has 54% of probability to cause an accident.
- (b). A total of 46% due to machinery accidents.
- (c). A total 14% due to getting hit by a vehicle.
- (d). A total 46% due to hit by a crane.

According to Rating Impact 3 (Medium):

- (a). Getting caught in between objects or materials has 31% of probability to cause an accident.
- (b). A total of 31% due to machinery accidents.
- (c). A total 23% due to getting hit by a vehicle.
- (d). A total 15% due to hit by a crane.

According to Rating Impact 4 (High):

- (a). Getting caught in between objects or materials has 0% of probability to cause an accident.
- (b). A total of 15% due to machinery accidents.
- (c). A total 15% due to getting hit by a vehicle.
- (d). A total 0% due to hit by a crane.

According to Rating Impact 5 (Very High):

- (a). Getting caught in between objects or materials has 0% of probability to cause an accident.
- (b). A total of 0% due to machinery accidents.
- (c). A total 0% due to getting hit by a vehicle.

(d). A total 0% due to hit by a crane.

4.6.3 Labour

This category examination shows the complete aggregate of responses against Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, Improper foot ware, Absent-mindedness/Nervousness which are able approve or demonstrate the member as per his experience or amplify scope. Labour analysis be subject to two phases.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes of Overexertion and physical fatigue, Careless actions of worker himself, Lack of training, improper foot ware, Absent-mindedness/Nervousness.

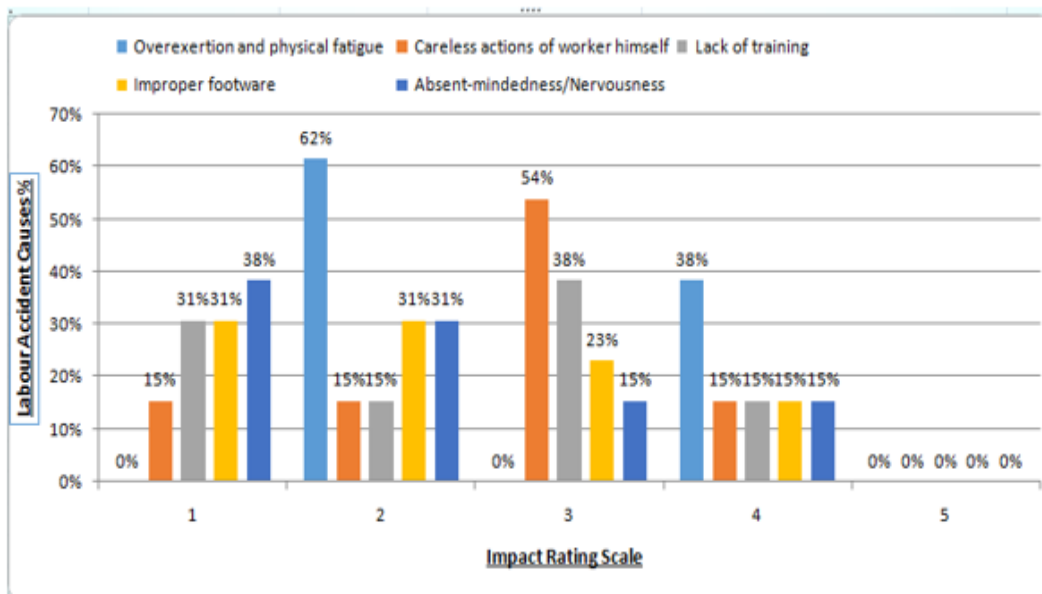


FIGURE 4.30: Rating Impact vs Causes of Accidents Due to Labour

Field level members had given the following responses against the established reasons related to labour. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Overexertion and physical fatigue has 0% of probability to cause an accident.
- (b). A total of 15% due to Careless actions of worker himself.

- (c). A total 31% due to Lack of training.
- (d). A total 31% due to improper foot ware.
- (e). A total 38% due to absent-mindedness/Nervousness.

According to Rating Impact 2 (Low):

- (a). Overexertion and physical fatigue has 62% of probability to cause an accident.
- (b). A total of 15% due to Careless actions of worker himself.
- (c). A total 15% due to Lack of training.
- (d). A total 31% due to improper foot ware.
- (e). A total 31% due to absent-mindedness/Nervousness.

According to Rating Impact 3 (Medium):

- (a). Overexertion and physical fatigue has 0% of probability to cause an accident.
- (b). A total of 54% due to Careless actions of worker himself.
- (c). A total 38% due to Lack of training.
- (d). A total 23% due to improper foot ware.
- (e). A total 15% due to absent-mindedness/Nervousness.

According to Rating Impact 4 (High):

- (a). Overexertion and physical fatigue has 38% of probability to cause an accident.
- (b). A total of 15% due to Careless actions of worker himself.
- (c). A total 15% due to Lack of training.
- (d). A total 15% due to improper foot ware.
- (e). A total 15% due to absent-mindedness/Nervousness.

According to Rating Impact 5 (Very High):

- (a). Overexertion and physical fatigue has 0% of probability to cause an accident.
- (b). A total of 0% due to Careless actions of worker himself.
- (c). A total 0% due to Lack of training.
- (d). A total 0% due to improper foot ware.
- (e). A total 0% due to absent-mindedness/Nervousness.

4.6.4 Safety Management

This category examination shows the reactions against Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, took unsafe position

or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure which are able to approve or demonstrate the member as per his experience or amplify scope. Safety Management analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Unsafe site conditions, Deficient enforcement of training, Unsafe method or sequencing, Took unsafe position or posture, Lack of enforcement of safety rules, Lack of safety rules and work procedure.

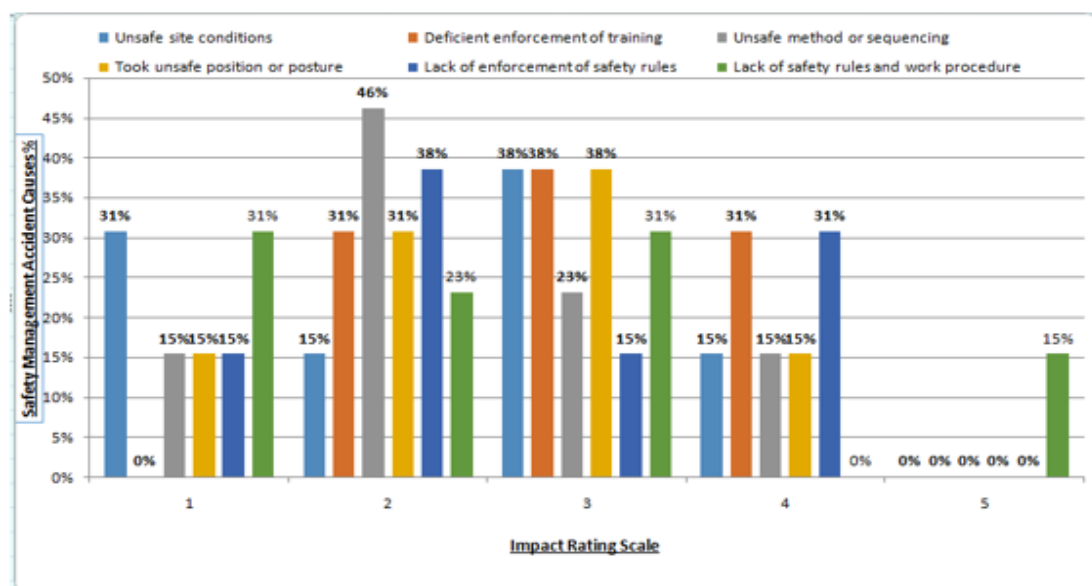


FIGURE 4.31: Rating Impact vs Causes of Accidents Due to Safety Management

Field level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Unsafe site conditions has 31% of probability to cause an accident.
- (b). A total of 0% due to deficient enforcement of training.
- (c). A total 15% due to unsafe method or sequencing.
- (d). A total 15% due to unsafe position or posture.
- (e). A total 15% due to lack of enforcement of safety rules.
- (f). A total 31% due to lack of safety rules and work procedure.

According to Rating Impact 2 (Low):

- (a). Unsafe site conditions has 15% of probability to cause an accident.
- (b). A total of 31% due to deficient enforcement of training.
- (c). A total 46% due to unsafe method or sequencing.
- (d). A total 31% due to unsafe position or posture.
- (e). A total 38% due to lack of enforcement of safety rules.
- (f). A total 23% due to lack of safety rules and work procedure.

According to Rating Impact 3 (Medium):

- (a). Unsafe site conditions has 38% of probability to cause an accident.
- (b). A total of 38% due to deficient enforcement of training.
- (c). A total 23% due to unsafe method or sequencing.
- (d). A total 38% due to unsafe position or posture.
- (e). A total 15% due to lack of enforcement of safety rules.
- (f). A total 31% due to lack of safety rules and work procedure.

According to Rating Impact 4 (High):

- (a). Unsafe site conditions has 15% of probability to cause an accident.
- (b). A total of 31% due to deficient enforcement of training.
- (c). A total 15% due to unsafe method or sequencing.
- (d). A total 15% due to unsafe position or posture.
- (e). A total 31% due to lack of enforcement of safety rules.
- (f). A total 0% due to lack of safety rules and work procedure.

According to Rating Impact 5 (Very High):

- (a). Unsafe site conditions has 0% of probability to cause an accident.
- (b). A total of 0% due to deficient enforcement of training.
- (c). A total 0% due to unsafe method or sequencing.
- (d). A total 0% due to unsafe position or posture.
- (e). A total 0% due to lack of enforcement of safety rules.
- (f). A total 15% due to lack of safety rules and work procedure.

4.6.5 Equipment

This category examination shows the reactions against Faulty equipment, Misplacing objects, Defective machinery on site, Defective forklift or Other Specified

Accident Cause which is able validate or indicate the participant as per his encounter or extend scope.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Faulty equipment, Misplacing objects, Defective machinery on site and Defective forklift.

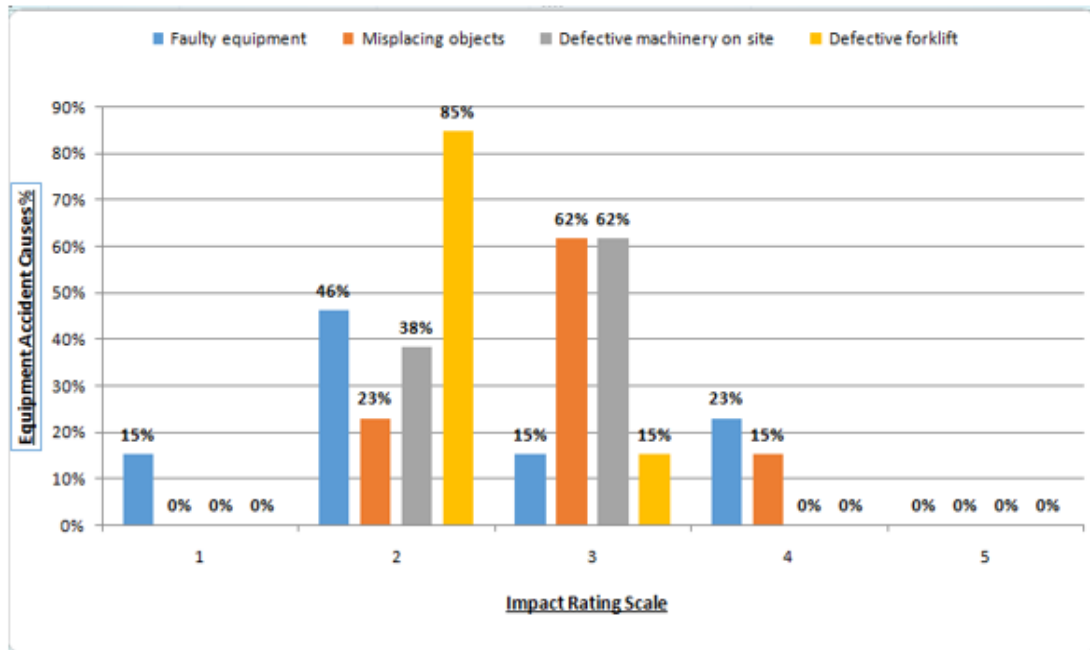


FIGURE 4.32: Rating Impact vs Causes of Accidents Due to Equipment

Field level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Faulty equipment has 15% of probability to cause an accident.
- A total of 0% due to misplacing of objects.
- A total 0% due to defective machinery on site.
- A total 0% due to Defective forklift.

According to Rating Impact 2 (Low):

- Faulty equipment has 46% of probability to cause an accident.
- A total of 23% due to misplacing of objects.
- A total 38% due to defective machinery on site.
- A total 85% due to Defective forklift.

According to Rating Impact 3 (Medium):

- (a). Faulty equipment has 15% of probability to cause an accident.
- (b). A total of 62% due to misplacing of objects.
- (c). A total 62% due to defective machinery on site.
- (d). A total 15% due to Defective forklift.

According to Rating Impact 4 (High):

- (a). Faulty equipment has 23% of probability to cause an accident.
- (b). A total of 15% due to misplacing of objects.
- (c). A total 0% due to defective machinery on site.
- (d). A total 0% due to Defective forklift.

According to Rating Impact 5 (Very High):

- (a). Faulty equipment has 0% of probability to cause an accident.
- (b). A total of 0% due to misplacing of objects.
- (c). A total 0% due to defective machinery on site.
- (d). A total 0% due to Defective forklift.

4.6.6 Team Issues

This category examination shows the reactions against due to Lack of team work, Inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job and Other Specified Accidents which is able validate or indicate the participant as per his encounter or extend scope. Team Issues analysis be subject to two phases:

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Lack of team work, inadequate construction planning and scheduling, Supervisory faults, Lack of knowledge/skills of job.

Field level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Lack of team work has 0% of probability to cause an accident.

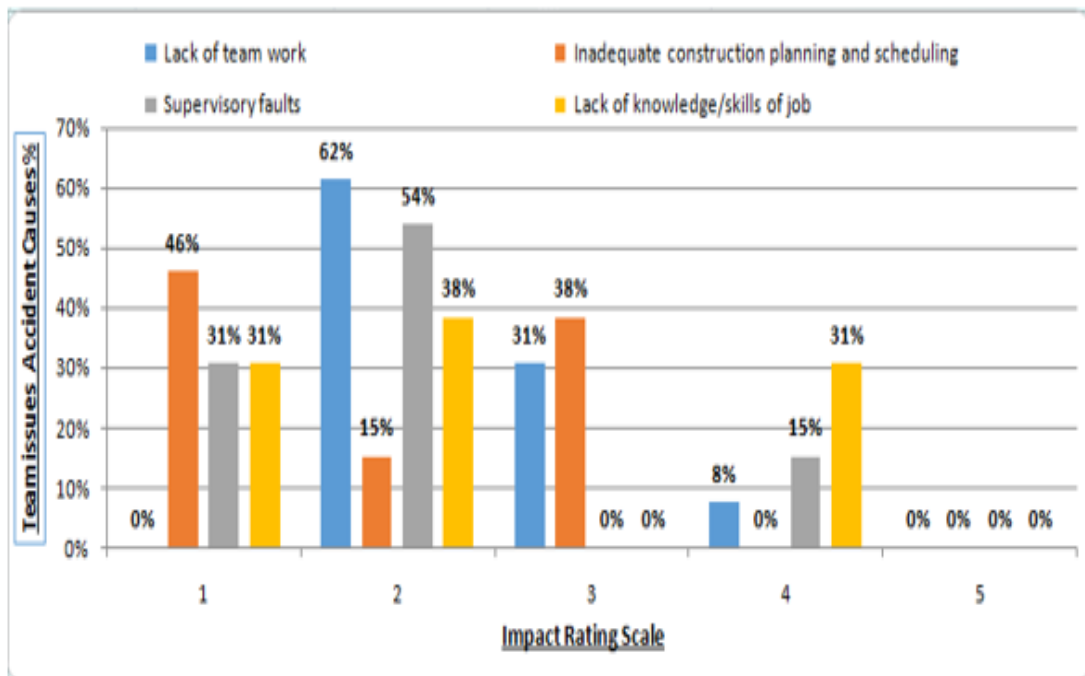


FIGURE 4.33: Rating Impact vs Causes of Accidents Due to Team Issues

- (b). A total of 46% due to inadequate construction planning and scheduling.
- (c). A total 31% due to supervisory faults.
- (d). A total 31% due to lack of knowledge/skills of job.

According to Rating Impact 2 (Low):

- (a). Lack of team work has 62% of probability to cause an accident.
- (b). A total of 15% due to inadequate construction planning and scheduling.
- (c). A total 54% due to supervisory faults.
- (d). A total 38% due to lack of knowledge/skills of job.

According to Rating Impact 3 (Medium):

- (a). Lack of team work has 31% of probability to cause an accident.
- (b). A total of 38% due to inadequate construction planning and scheduling.
- (c). A total 0% due to supervisory faults.
- (d). A total 0% due to lack of knowledge/skills of job.

According to Rating Impact 4 (High):

- (a). Lack of team work has 8% of probability to cause an accident.
- (b). A total of 0% due to inadequate construction planning and scheduling.
- (c). A total 15% due to supervisory faults.

(d). A total 31% due to lack of knowledge/skills of job.

According to Rating Impact 5 (Very High):

- (a). Lack of team work has 0% of probability to cause an accident.
- (b). A total of 0% due to inadequate construction planning and scheduling.
- (c). A total 0% due to supervisory faults.
- (d). A total 0% due to lack of knowledge/skills of job.

4.6.7 Scaffolding/Ladder

This category examination shows the reactions against Scaffolding not properly installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Scaffolding not properly installed, Inappropriate use of ladders and hoists, Collapse of scaffold causing damage to adjacent property, Loose bonding of scaffolding.

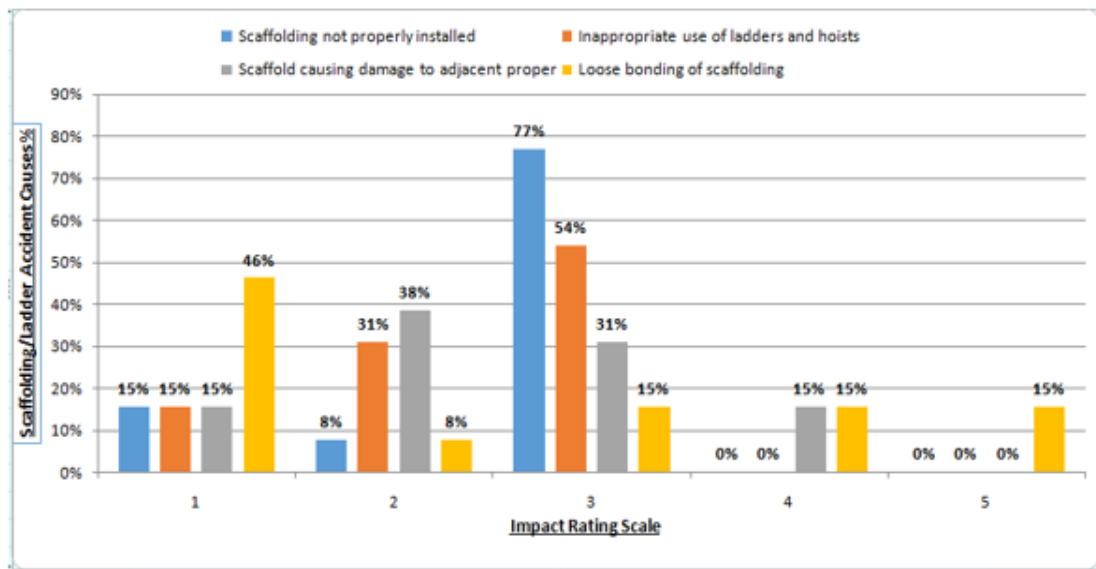


FIGURE 4.34: Rating Impact vs Causes of Accidents Due to Scaffolding/Ladder

Field level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:
According to Rating Impact 1 (Very Low):

- (a). Scaffolding not properly installed has 15% of probability to cause an accident.
- (b). A total of 15% due to inappropriate use of ladders and hoists.
- (c). A total 15% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 46% due to lose bonding of scaffolding.

According to Rating Impact 2 (Low):

- (a). Scaffolding not properly installed has 8% of probability to cause an accident.
- (b). A total of 31% due to inappropriate use of ladders and hoists.
- (c). A total 38% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 8% due to loose bonding of scaffolding.

According to Rating Impact 3 (Medium):

- (a). Scaffolding not properly installed has 77% of probability to cause an accident.
- (b). A total of 54% due to inappropriate use of ladders and hoists.
- (c). A total 31% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 15% due to loose bonding of scaffolding.

According to Rating Impact 4 (High):

- (a). Scaffolding not properly installed has 0% of probability to cause an accident.
- (b). A total of 0% due to inappropriate use of ladders and hoists.
- (c). A total 15% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 15% due to loose bonding of scaffolding.

According to Rating Impact 5 (Very High):

- (a). Scaffolding not properly installed has 0% of probability to cause an accident.
- (b). A total of 0% due to inappropriate use of ladders and hoists.
- (c). A total 0% due to collapse of scaffold causing damage to adjacent property.
- (d). A total 15% due to loose bonding of scaffolding.

4.6.8 Site Condition

This category examination shows the reactions against Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions

members of participants for accidents causes due to Wet slippery floors, Unstable stacking of materials, Poor storage of combustible material.

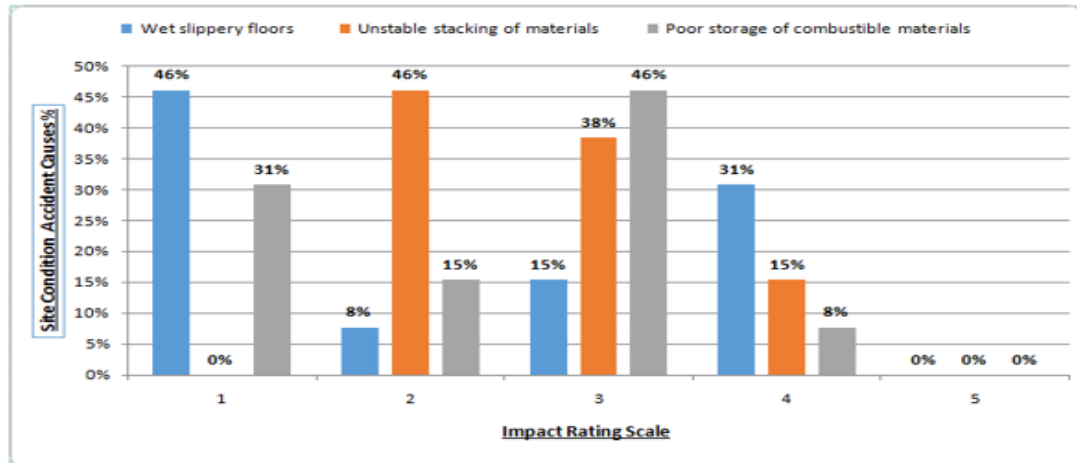


FIGURE 4.35: Rating Impact vs Causes of Accidents Due to Site Condition

Field level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- Wet slippery floors has 46% of probability to cause an accident.
- A total of 0% due to unstable stacking of materials.
- A total 31% due to poor storage of combustible material.

According to Rating Impact 2 (Low):

- Wet slippery floors has 8% of probability to cause an accident.
- A total of 46% due to unstable stacking of materials.
- A total 15% due to poor storage of combustible material.

According to Rating Impact 3 (Medium):

- Wet slippery floors has 15% of probability to cause an accident.
- A total of 38% due to unstable stacking of materials.
- A total 46% due to poor storage of combustible material.

According to Rating Impact 4 (High):

- Wet slippery floors has 31% of probability to cause an accident.
- A total of 15% due to unstable stacking of materials.
- A total 8% due to poor storage of combustible material.

According to Rating Impact 5 (Very High):

- (a). Wet slippery floors has 0% of probability to cause an accident.
- (b). A total of 0% due to unstable stacking of materials.
- (c). A total 0% due to poor storage of combustible material.

4.6.9 Due to Fire and Explosion

This category examination shows the reactions against Fires and explosions, Trench collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

In this category of Accidents, responses outcomes from participant are to be understood. This category analysis shows the probability of responses against Positions members of participants for accidents causes due to Fires and explosions, Trench collapse, affected by toxic gases, Eyes effected by UV rays during welding, skin burn in welding process.

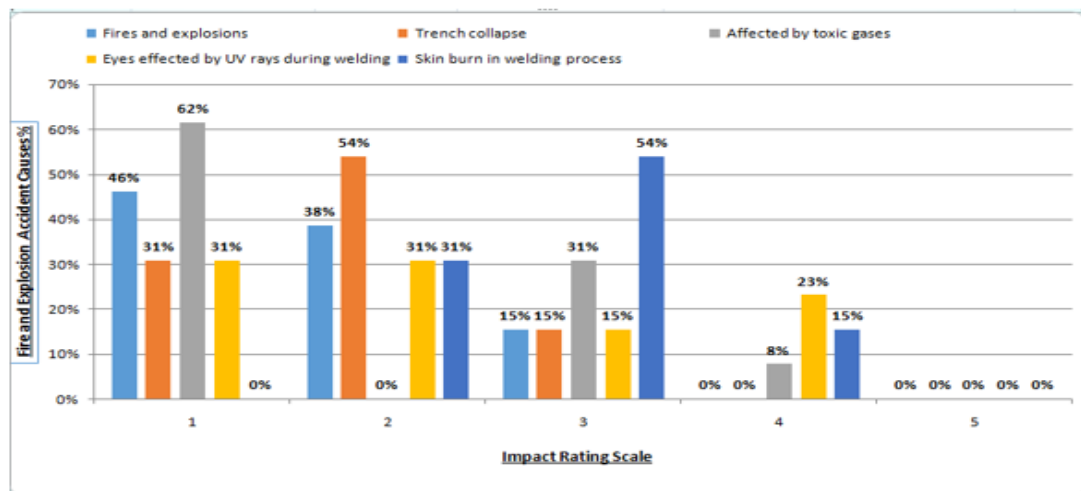


FIGURE 4.36: Rating Impact vs Causes of Accidents Due to Fire/Explosion

Field level members had given the following responses against the established reasons related to safety management. They had observed the following probabilities:

According to Rating Impact 1 (Very Low):

- (a). Fire & Explosion has 46% of probability to cause an accident.
- (b). A total of 31% due to affected by trench collapse.
- (c). A total of 62% due to affected by toxic gases.
- (d). A total 31% due to eyes effected by UV rays during welding.

(a). A total 0% due to skin burn in welding process.

According to Rating Impact 2 (Low):

(a). Fire & Explosion has 38% of probability to cause an accident.

(b). A total of 54% due to affected by trench collapse.

(c). A total of 0% due to affected by toxic gases.

(d). A total 31% due to eyes effected by UV rays during welding.

(e). A total 31% due to skin burn in welding process.

According to Rating Impact 3 (Medium):

(a). Fire & Explosion has 15% of probability to cause an accident.

(b). A total of 15% due to affected by trench collapse.

(c). A total of 31% due to affected by toxic gases.

(d). A total 15% due to eyes effected by UV rays during welding.

(e). A total 54% due to skin burn in welding process.

According to Rating Impact 4 (High):

(a). Fire & Explosion has 0% of probability to cause an accident.

(b). A total of 0% due to affected by trench collapse.

(c). A total of 8% due to affected by toxic gases.

(d). A total 23% due to eyes effected by UV rays during welding.

(e). A total 15% due to skin burn in welding process.

According to Rating Impact 5 (Very High):

(a). Fire & Explosion has 0% of probability to cause an accident.

(b). A total of 0% due to affected by trench collapse.

(c). A total of 0% due to affected by toxic gases.

(d). A total 0% due to eyes effected by UV rays during welding.

(e). A total 0% due to skin burn in welding process.

4.7 Top 10 Accident Causes Effecting in Pakistan

Different level of respondent has assessed the typical probabilities of occurrence of top ten accidents reasons. 4.37 shows the probability of occurrence of top 10

accidents reasons. These results were extracted from data that was collected from industry experts by visiting their organizations.



FIGURE 4.37: Accidents vs their Probability

Below Table 4.4 shows summary of top 10 accidents reasons with their respective Probabilities.

TABLE 4.2: Top Ten Accidents with their Percentage of Effects

S. No	Top 10 Accident Reasons	Percentage of Occurrence
1	Lack of safety rules and work procedure	74%
2	Lack of training	73%
3	Lack of enforcement of safety rules	72%
4	Careless actions of worker himself	69%
5	Falls from heights	69%
6	Deficient enforcement of training	67%
7	Falling debris, material or objects	67%
8	Unsafe site conditions	66%
9	Eyes effected by UV rays during welding	64%
10	Slips and falls on the floor/roof	64%

Chapter 5

Discussion and Conclusion

5.1 Introduction

This chapter defines the findings and discussions of Accidents Causes. Obtained result from previous chapter consisted of reflections and assessments. Accidents causes in different Construction projects which were investigated will be assessed. Total percentage of corporate levels participant are 9%, Senior Level Participants are 45%, 34% of Intermediate levels participants and 11% of Field level participants out of 100%.

5.2 Top Ten Accident Causes Effecting the Projects of Pakistan

5.2.1 Lack of Safety Rules and Work Procedure

Safety Management Accidents are the most realistic Accidents reason in construction Project. Accidents due to lack of safety rules and work procedure were prominent in previous researches. Basically, Safety related Accident reasons were classified among the uppermost Accident factors in the reviewed articles. Our study also validated this argument w.r.t Pakistan construction industry.

According to our study this reason of accident is top ranked with 74%. This shows

that in Pakistani construction this reason has high effect on construction projects. As from literature authors has assessed that the accidents due to lack of safety rules and work procedure is one of the main causes of accident. According to their study 80% chances of accident on construction project are due to this reason [24].

5.2.2 Lack of Training

Labor related Accidents are the most authentic accident reason in construction Project. Their issues were prominent in previous researches. Many authors have repeated their consideration and investigation according to Labor related Accidents. Practically, Labor related Accidents reasons were ranked among the top Accidents factors in the reviewed articles while not a single Labor related Accidents issue is surfaced among top Accident causes in the current research.

According to our study, accidents due to lack of training has been ranked second with total 73%. Our ranking shows its important in Pakistan construction industry.

As in the literature various authors believed that the behavior of labour has very high magnitude to cause to affect the productivity and efficiency of the project [7].

Authors has assessed that 47% of the accidents were caused by workers improper action/behaviour. Hence through proper training we can mitigate this cause of accident [1].

5.2.3 Lack of Enforcement of Safety Rules

Safety Management Accidents have been repeatedly reflected and investigated by various authors. As stated above it is classified among the uppermost accidents factors in the reviewed articles. According to our study lack of enforcement of safety rules has total 72% of magnitude to cause the accident.

Authors has assessed that the accidents due to safety management issues like Unsafe site conditions, Unsafe method or sequencing, Lack of enforcement of safety

rules has very high magnitude to affect the productivity and efficiency of the project [25].

5.2.4 Careless Actions of Worker Himself

Labor related Accidents are the most authentic accident reason in construction Project. These issues were prominent in previous researches. Practically, labor related Accidents reasons were ranked among the top accidents factors in the reviewed articles. In current research it is placed at fourth position among other accident causes. According to our study, accidents due to careless actions of worker himself has total 69%. According to authors labour was involved in accidents during almost all type of projects like Residential, Commercial, Industrial and Highway. He assessed that the total 34% of this reason of accident impact during the project. Authors has assessed that 47% of the accidents were caused by workers improper action/behaviour. Hence through proper training we can mitigate this cause of accident [3].

5.2.5 Falls from Heights

Slips and falls related Accidents are the most common Accidents reason in construction Project. Slips and fall related accidents issues are prominent in previous researches.

From result of current study, the total 69% of accidents happen due to Slips and falls from heights. Authors has assessed that 36% accidents were due to fall from heights [11].

5.2.6 Deficient Enforcement of Training

Safety Management Accidents are the most important accidents reason in construction Project. Accidents due to lack of safety management procedure are prominent in previous researches. These reasons are classified among the uppermost accident factors in the reviewed articles. Our study also validated this

argument w.r.t Pakistan construction industry most of safety management categories are listed in our top 10 list of accident causes.

According to our study this reason of accident is top ranked with 67%. As from literature Authors has assessed that the accidents due to lack of safety rules and work procedure is one of the main causes of accident. According to their study 80% chances of accident on construction project are due to this reason [24].

5.2.7 Falling Debris, Material or Objects

Slips and falls related Accidents are the most common accidents reason in construction Project. Slips and fall related accidents issues are prominent in previous researches.

From result of current study, the total 67% of accidents due to Slips and falls on the floor/roof. These reasons of accident can greatly affect the project timeline and budget.

Authors has assessed the different probabilities of accident due to slip and fall. As from them, they reported that 68% of project had affected by accidents due to slip and fall from height or floor,60% from falling objects [1].

5.2.8 Unsafe Site Conditions

Site Condition related accidents are also the reason for the most genuine accidents in construction projects.

From result of current study, the total 66% of accidents due unsafe site conditions. Authors has assessed that the accidents due to site issues can affect the productivity and efficiency of the project. As per their findings, they ranked 4 out of 10 for the accidents due to floor deficiency/floor collapse [2].

5.2.9 Eyes Effected by UV Rays During Welding

Due to Fire & Explosion Related Accidents issues were prominent in previous researches. Different authors have repetitively discussed Accidents causes like

Eyes affected by UV rays during welding in their research.

From result of current study, the total 64% of accidents are eyes effected by UV rays during welding. These reasons of accident can cause permanent damage to human life. Authors has assessed that the accidents due to explosions can affect the productivity and efficiency of the project [1]. According to them 4% of the accidents during projects are caused because of explosions on site. According to authors fire and explosion and Radiations have very low magnitude of causing accident, they evaluated as 0.1% for both types [34].

5.2.10 Slips and Falls on the Floor/Roof

Slips and falls related Accidents are the most common accidents reason in construction Project. From the result of current study, the total 64% of accidents due to Slips and falls on the floor/roof.

Authors has assessed the different probabilities of accident due to slip and fall. As from them, they reported that 68% of project had affected by accidents due to slip and fall from height or floor, 60% from falling objects [1]. Authors research says that 52% of the accidents was caused by fall from different places like fall from height and falling on the floor because of slippery floor [32].

5.3 Lesson Learnt

- (1). From result, author learnt that mentioned above are the top ten reasons of accidents which were affecting Pakistan construction industry.
- (2). Follow health and safety guidelines.
- (3). Provide information on the safety and health hazards of the workplace and the controls for those hazards.
- (4). Safety training is important tools for informing workers and managers about workplace hazards and controls so they can work more safely and be more productive.

Chapter 6

Conclusion and Recommendation

6.1 Introduction

Prepared the Questionnaire instruments regarding possible accidents 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 accidents.

6.2 Conclusion

Research project was ended with the below conclusions: (1). A total of 9 categories and 39 sub categories were found to be the major contribution to accidents in Pakistan construction industry.

(2). A list of accident causes based on its percentage of occurrence was prepared.

(3). Top ten accident reasons include, Lack of safety rules and work procedure 74%,Lack of training 73%,Lack of enforcement of safety rules 72%,Careless actions of worker himself 69%,Falls from heights 69%, Deficient enforcement of training

67%, Falling debris, material or objects 67%, Unsafe site conditions 66%, Eyes affected by UV rays during welding 64%, Slips and falls on the floor/roof 64% as established from analysis of sub categories data.

(4). There corresponding major categories include Safety Management, Labour, Slip and Fall, Fire and explosion.

(5). Most of the categories and sub categories were extracted from International organizations published data.

(6). A very limited literature was observed about Pakistan construction industry results, that makes this thesis research novel and unique.

(7). The construction accidents data was not officially recorded/provided by the respondents, it was based on their experience in construction industry.

6.3 Limitations

(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 400 number of respondents at least to arrive at even better results.

(2). Current research was limited to housing, industrial sectors and mega construction organizations. It may be extended to roads, dams and other mega construction projects.

6.4 Future Work Recommendations

The research project ends up with the following recommendations for the future studies related to Accidents causes.

(1). The demographics of respondents should be expended to all provinces and cities of Pakistan for providing a better picture of accidents problems to entire country.

(2). Published reports of Government organizations were not available for current research. An effort he made to get these reports from Safety & Health Commission of Pakistan for accidents in construction projects.

- (3). Provide training to all managers, supervisors, workers, and contractor, sub-contractor, and temporary agency workers on Safety and health policies, goals, and procedures.
- (4). Provide information on the safety and health hazards of the workplace and the controls for those hazards.
- (5). Safety training is important tools for informing workers and managers about workplace hazards and controls so they can work more safely and be more productive.
- (6). To improve the safety planning, Safety management system, site Personal Protection Equipments (PPEs).
- (7). To improve the proficiency of Safety measurement plans regarding site condition, to counter the protection issues due to accidents and mitigate them with the maximum probability of correctness.
- (8). Make strong Communication among staff and labour regarding Health & Safety Engineering (HSE) on the sites.

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Appendix-A

Questionnaire

Questionnaire

Causes of Accidents in Construction Projects	Rating Scale				
	V. High	High	Medium	Low	V. Low
	5	4	3	2	1
Slips and Falls					
Falls from heights					
Slips and falls on the floor/roof					
Falling debris, material or objects					
Fall from opening or stairways					
Machinery					
Getting caught in-between objects or materials					
Machinery accidents					
Getting hit by a vehicle					
Hit by a Crane					
Labour					
Overexertion and physical fatigue					
Careless actions of worker himself					
Lack of training					

Improper footwear					
Absent-mindedness/Nervousness					
Safety Management (Q4)					
Unsafe site conditions					
Deficient enforcement of training					
Unsafe method or sequencing					
Took unsafe position or posture					
Lack of enforcement of safety rules					
Lack of safety rules and work procedure					
Due to Equipment					
Faulty equipment					
Misplacing objects					
Defective machinery on site					
Defective forklift					
Team Issues					
Lack of team work					
Inadequate construction planning and scheduling					
Supervisory faults					
Lack of knowledge/skills of job					
Scaffolding/ Ladder					
Scaffolding not properly installed					
Inappropriate use of ladders and hoists					
Collapse of scaffold causing damage to adjacent property					
Loose bonding of scaffolding					
Site Condition					

Wet slippery floors					
Unstable stacking of materials					
Poor storage of combustible materials					
Due to Fire & Explosion					
Fires and explosions					
Trench collapse					
Affected by toxic gases					
Eyes affected by UV rays during welding					
Skin burn in welding process					