

# Factor Affecting Performance of Construction Projects

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**Abstract** - Success of The Constructions Any Projects Depends On Its Performance. Constructions Divides in Three Phases, Pre-Constructions Phase, Construction Phase and Post-Constructions Phase. The Constructions it Self Very Time Consuming Process also Success of Construction Depends on Its Performance. There are many Factors That Obstruct Performance of Constructions Cause Delay in Constructions or Failure in Constructions.

Throughout The World In the business environments Within Which Constructions Organizations Operate Continues to Change the Rapidly. The Organizations Failing to Adapt and Respond to The Complexity of The New Environment Tend to Experience Survival Problem. With Increasing The higher users' Requirements, Environmental Awareness and Limited Resources on One side, And high Competition for Constructions Business Marketplace on other side, Contractors have to be Capable of Continuously Improving Their Performance. The Constructions Industry is Complex in Its Nature because it Comprises large Number of parties as Owner (client), Contractor, Consultant, Stakeholder, and Regulator. Despite this complexity, the industry plays a Major Role in Development and Achievement of Society's Goal.

The Main Aim Of This Study Is To Identified The Critical Factors Influencing Project Performance For Different Objectives In The Constructions Projects And Analyse By The Relative Important Index Method The Factor Affect Of Performance in Constructions Industries. In this Paper Factors Affecting the Performance of Constructions Projects in The Region of Ahmedabad Will be Analyzed. Performance Indicator are Used To Measure Performance In The Constructions Projects.

**Key Words:** Project Planning, Analysis of Performance, Factors, Relative Important Index, Construction Projects.

## 1. INTRODUCTION

This Constructions Industry Is Play Primary Role in Advances And Success of The Target of Society. The Construction Industry Is One of The Largest and it Adds To About 10% of the Gross National Products (GNP) In Industrialized Countries. Construction Industry is Complex, In Its Nature as It Involves Large Number of Parties such as Clients, Contractors, Consultants, Stakeholders, Shareholders

and Regulators. Performance is Associated with Several Factors such as Time, Cost, Quality, Client Satisfaction, Productivity and Safety. There are Other Genuine Reasons like Closures, Modification of Drawings and Changes of the Design. Other Grounds Affecting Construction Projects Performance are Poor Management and Guidance; inapt Participants; poor Relations and Co-ordination; Lack of Motivation, Insufficient Infrastructure, Political Problems, Cultural Problems and Economic Conditions. Found that Factors like Inadequate Leadership, Poor site Management, Lack of Manpower Skills, Lack and Breakdown of Equipment Plays a Very Important Parts in Constructions Project Delays in United Arab Emirates.

The Recognized Co-ordination Among Participants, Leadership, Skills And Co-ordination of Project Managers, Project Manager Competence, Support of The Top Management, Economic and Climatic Condition, Social Condition, Participants Co-ordination, Decision making As Key Factors.

The Constructions Industry Performance is affected by National Economies. Construction Industry is one of The Largest Single Industries That Contribute Greatly to the Developments of nation including India. The Pace of The Economic Growth of Any Nation Can be measured by The Development of the Physical Infrastructures Such as Building, road And Bridge. Successful Building Construction Projects Are Those Project Finished on The Time, within Budget, in Accordance With Specifications And to Stakeholders Satisfaction.

The Factors Impacting on Project Performance in Developing Countries. Shortage of Skills of Manpower, Poor Supervisions, Poor Site Management, Unsuitable Leadership, Shortage and Breakdown of Equipment Among Others Contribute to Constructions Delays in The United Arab Emirates.

The Performance of a Contractors Will Definitely Co-relate with The Performance of The Contract. He further observed that the Evaluation of Performance has been a Challenge for The Constructions Industry for Decades. Several Model and Methods have been proposed by Researchers for the Evaluation of Project Performance. International Construction Project Performance is affected by More Complex and Dynamic Factors than Domestic Projects; frequently being exposed to Serious External Uncertainties

Such as Political, Economic, Social, and Cultural Risk, as Well as Internal Risk from within the Projects.

### 1.1 OBJECTIVES

- i. To Investigate The Factor Affecting Of Performance in Constructions Industries.
- ii. To Identify The Critical Factors Influencing Project Performance For Differents Objectives In The Constructions Projects.
- iii. Analysis of the Factors and Ranking the Factors.
- iv. To Gives Suggestion and Recommendation To Improve The Performance Of The Constructions Industries.

### 1.2 RESEARCH METHODOLOGY

In this study, factors that affect the project Performance In construction has been obtained from various literature studies. Questionnaires were designed on structural basis to get information about the personal data of the respondents and their experience on issues related to Performance of Projects in construction. The questionnaires were sent to the construction industry by mail and interviews were conducted among construction personnel namely contractor, client, consultant, engineer. The data collected were analysed using the relative importance index (RII) method to rank the factors Performance of Projects on construction sites. The RII for each factor was computed from the analysis of the rating indicated by the respondents with the use of five-point likert scale. The value of 1,2,3,4 and 5 were respectively defined as below. After ranking suggestions can be provided for improving the Performance of construction projects.

**Table -1:** Importance scale for ranking the factors

Very Low	Low	Moderate	High	Very High
1	2	3	4	5

## 2. LITERATURE REVIEW

[1] (Raid Abidali, Yerevan Ali, 2018) In This Paper We Described Various Factors Influence on the Contractor's Performance in Constructions Projects in Iraq. The Main Factors Was Reported by The Survey Respondent Including Cash Flow of the Projects, Average Delay in The Regular Payments, Contractors Experience, Design Team Experience, and Site Preparation Time, are The Essential Factors That Influence Performance of Contractors in the Constructions Projects. Cash Flow Problem Were Considered Is An Essential Problem Which Needing Proper Treatments by both Side of The Clients and The Contractors.

[2] (Samart Homthong, 2016) This Research Paper Gives to Success in Projects Management of a Completed Facility

Depends on Many Issues with a Variety of Factor. Identification of CSFs, Particularly in the terms of The Operation and Maintenance Phase at The Outset of Project. This paper Provides insight into The CSFs Influencing Constructions Project Performance for Different Objectives, Focusing on the Operations and Maintenance Phase in The Context of Projects Management.

[3] (Ghanim A. Bekr, 2017) In This Paper a Structured Questionnaire Survey Approach Was Considered to Study That Impact of The Various Characteristic and Reasons Affecting Constructions Projects Performance. The Questionnaire Assists to Study the Attitudes of Owners, Consultants and Contractors Towards key Performance Indicators in The Constructions Industry. The Main Groups Considered in This Thesis are Time, Quality, Productivity, Client Satisfactions, Regular and Community Satisfaction, Health and Safety, and Environment.

[4] (Adnan Enhassi, Sherif Mohamed, 2009) This Research Paper in The Contractor are Counseled to Minimize Waste Rates through Project Implementation for Improving Cost. They should be more interested in The Conformance to Projects Specification to Overcome Disputes, Time, and Cost Performance Problem. Quality materials should be of a greater interest for The Contractors in Order to Improve cost, time, and quality Performance. This can be finished by applying quality training and meetings that are essential for Execution of improvement. Contractors are urged to be more Interested in Sequencing of work According to the schedule. Contractors should have a Cost Engineer in their Project to Successfully Control of Costs.

[5] (Babalola Ifedolapo Helen, 2015) This Research Paper Gives To Study The Impact of Various Attributes And Factors Affecting Constructions Projects Performance In Akure, And The Attitude of Project Clients, Consultants and Contractors in The Nigerian Constructions Industry. Forty-six (46) Factors were considered in This Study and were Listed under Eight Groups Based on The Relevant Literature Review and Data Collected. The Result Were Analyzed, Discussed To Identify the Most Important Factors, In Which Average Index Method (A.I) Was Used to The Determine Clients, Consultants and Contractors Perception of Constructions Projects in Akure, Nigeria.

[6] (Melba Alias, Dhanya R, 2015) The Increasing and High Cost of Machinery and Material have been Ranked First Factor in The Cost Segment by The Respondent and Then Inadequate labors And Incorrect Planning Serves Second and Third Ranks. Escalation of Materials Prices Affects The Liquidity Of The Owner And The Profit Rates Of Contractor. Average Delay Due to Closures And Material Shortages, Time needed To Rectify Defect, Average Delay in Payment From Owner To Contractor have been Ranked First, Second and Third Respectively Under Time Factors. The Leadership Skills for Projects Manager Is of High Importance When It

Comes to Clients Satisfaction Factors. If There is No Proper Leadership It Affects the Performance of The Industry. The Second Factor Is Information Co-ordination Between Project Parties Else There Will be Disputes in Project, So the Co-ordination Factor Is of Importance.

[7] (Peter Orero Nyangwara, 2015) Constructions Industry is Considered as An Important Sector in The World It Develops and Achieves the Goal of Society. The Performance of The Constructions Industry is affected by Client, Contractor, Consultant, Stakeholder, Regulator, National Economies and Other. The Main Aim of This Thesis is To Identify the Factors Affecting Performance of Constructions Project in The Coastal Region of Kenya.

[8] (Saraf D. D, 2015) The Most Important Factors Agreed By The Owner, Contractor, and Engineer as The Main Factors Affecting The Performance Of The Construction Project: Improper Planning, Improper Designing, Site Management, Decision Making, Constructions Method, Shortage of Labor And Technical Personnel, Quality and Shortage Of Material, Constructions Mistakes And Defectives Work, Productivity. Engineers Should Perform Their Activities Properly to Improve Productivity Which helps Improve of Constructions Project. Contractors Should Not Increase the Number of Project That Can't be Performed Successfully. Proper Motivation and Safety Systems Should be established for Improving the Productivity Performance of Constructions Project. Contractors are counseled to Minimize Waste Rates through Project Implementation for Improving the Cost. They should be More Interested in Conformance to Projects Specification to Overcome Dispute, Time, and Cost Performance Problem.

[9] (Eng. Faisal AL Qahtani, 2015) In This Paper The Conceptual Framework Was Developed To Shows The Different Aspect and factor That Affect Projects Outcome And Performance. It is Significant To Note That Factors Identified In This Research Affecting The Projects Performance And Outcome Are Inter-related In Fundamental Ways.

[10] (Nipin Joseph Babu, 2015) The Results Indicate That The Average Delay Because Of Closures Leading To Material Shortage Was The Most Important Performance Factor, It has First Rank Among All Factors From The Perspectives Of Owner, Consultant, and Contractor. This Contract between All Target Groups is Drawn to the Tough Political Circumstances. The Most Important Factors Agreed By The Owner, Consultant, and Contractor as The Main Factors Affecting The Success Of Constructions Projects Is: Escalation Of Materials Prices, Availability Of Resources As Prearranged Through Project Period, Usual Delay Because Of Closings Leading To Material Shortage, Availability Of

Personnel With a High Understanding And Experiences, Quality of Equipment And Raw Materials in the Project, and Leadership Skills for the Projects Managers.

Political and Business Environment Risks in Their Cost Estimation for Overcoming Delay Because Of the Closures Leading To Materials Shortages. Proper Motivation and Safety Systems Should be Established For Improve The Productivity Performance Of The Constructions Projects.

## 2.1 CRITICAL REVIEW

This critical review is defining for all the literature paper. The Contractor are Counseled to Minimize Waste Rates Through Project Implementation For Improving Cost. The Escalation of Materials Prices Affects The Liquidity Of The Owner And The Profit Rates Of Contractor. The Leadership Skills for Projects Manager Is of High Importance When it comes To Clients Satisfaction Factors. If here is No Appropriate Management It Disturbs the Performance of the Industry. The Data Co-ordination amid Project Parties Else around will be Clashes in Project, so the Co-ordination Factor Is of Importance. The Performance of the Constructions Industry is affected by Client, Contractor, Consultant, Stakeholder, Regulator, Nationwide Economies and Other. The Engineers Should Accomplish Their Activities Accurately to Recover Productivity Which helps Progress of Constructions Project. The Contractors may not raise The Number of Project that can't be Performed Successfully. Proper Motivation and Safety Systems Should be established for Improving the Efficient Performance of Constructions Project.

## 3. DATA COLLECTION

Data collection in general means a plan of action which the research objectives can be questioned, and it can be classified into two types namely, quantitative approach and qualitative approach. Qualitative approach seeks to gain insights and to understand people's perceptions, or opinion towards a particular object. As well, it is used when a limited amount of knowledge about the topic are available. Quantitative approach seeks to collect factual data and to study relationship between facts and how such facts and relationships accord with theories and findings of any research executed previously. The research through literature reviews and discussion with some person involved in the construction project identified a total of 57 factors which are mainly affecting in the Performance of Construction Project. The data will be collected from residential construction projects located in Ahmedabad. The Data Collection Is Collected the Percentage of Responses from the Type of Organization.

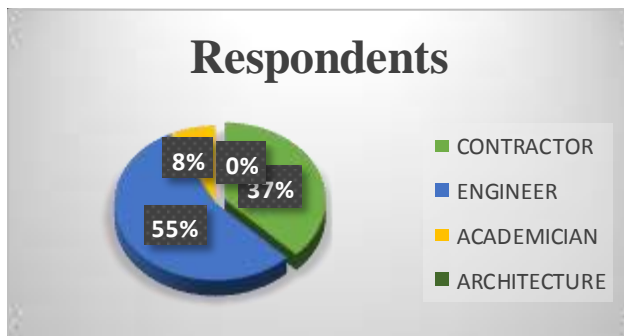


Chart -1: Types of Organizations that Responded

### 3.1 QUESTIONNAIRE DESIGN

The questionnaire was formulated by seeing the relevant Literatures in the area of labour productivity of Construction Company. The engineer interview questionnaire is shown in below. The questionnaire was validated with experts for clarity, ease of use, and value of the information that could be gathered. The questionnaire survey is divided into two parts. The first part consists of general information like type of company, experience; value of their project etc. and the second part in The Study after Results of Different Groups Consisting of 57 Factors That Mentioned in the Questionnaire Have Been Discussed in Details. The Factors Were Divided Into Eleven Groups Have The Following Titles:- Cost ,Time, Quality, Productivity, Project Management Action, Client satisfactions, Community Satisfactions, People , Health And Safety, Environment, Innovation And Learning.

### 4. DATA ANALYSIS

Relative Importance Index method will be utilized to rate the different parameters. These evaluations make it possible to analyze, the relative importance of the parameters as observed by the arrangements of respondents. Below formula will be used to compute the Relative Important Index Method.

$$RII = \sum W / A * N$$

Where,  
W = Ratings provided to each parameter (ranging from 1 to 5),  
A = Highest rating (i.e. 5 in this circumstance),  
N = Total respondents.

#### 4.1 RELIABILITY TEST

We may choose to use questionnaire items. These questionnaire items are part of the measurement procedure. This measurement procedure should provide an accurate representation of the construct it is measuring if it is to be considered valid. For example, if we want to measure the

construct, intelligence, we need to have a measurement procedure that accurately measures a person's intelligence. Reliability test to the consistency of the results in research. Reliability is highly important for psychological research. This is because it tests if the study fulfils its predicted aims and hypothesis and ensures that the results are due to the study and not any possible extraneous variables. Here spits half reliability test has been done. Split-half reliability is subtype of internal consistency reliability. The split-half reliability is obtained by determining the correlation between the two totals "set" scores. i.e. if it is reliable (more than 0.6) than it more likely to get similar results on various other places. Split-Half Reliability Method for Likert Scale: The Spearman Brown formula is used to compute reliability where Likert scale is adopted.

$$Rsb = 2Rhh / 1 + Rhh$$

Where, Rhh indicates the correlation of the scores in two half tests. After the division of data in two halves. After having two halves of the test, the correlation between them is calculated.

$$Rhh = \sum (X - \bar{X})(Y - \bar{Y}) / \sqrt{\sum (x - \bar{x})^2 * (y - \bar{y})^2}$$

Where,  
X = one respondent's score for the first half,  
 $\bar{X}$  = Ratio of the mean of the first half and total no of questions  
Y = One respondent's score for the second half,  
 $\bar{Y}$  = Ratio of the mean of the second half and total no of questions.

Calculations of Rhh and  $\alpha$ ,

$$Rhh = 143323.61 / \sqrt{188884.23 * 135288.65} = 0.8965380$$

$$2Rhh = 1.7931$$

$$\alpha = 2Rhh / 1 + Rhh = 1.7931 / 1 + 0.8965 = 0.94$$

After the calculation  $\alpha = 0.94 > 0.60$ , hence it has good reliability.

#### 4.2 DATA ANALYSIS PROCEDURE & OUTPUT IN RII

The result shows the relative index for each factor which shows an importance of each factor as compare to others. The relative index is calculated by summation of total ratings of each factor, which is divided by a multiplication of highest Likert scale and number of respondents. After finding the

relative importance index, they are arranged in a hierarchical order (i.e. from top to bottom). So, by finding out the relative ranking of each factor we can know about the most important and least important factor out of all the factors.

#### 4.2.1 Analysis Performance of the All Factors by Relative Importance Index (RII)

**Table -2: Analysis of all Factors by RII Method and Rank**

TYPE OF FACTOR	$\Sigma W$	RII	RANK
<b>Cost Related Factors</b>			
Market share of organization	122	0.61	23
Cash flow of project	115	0.575	36
Profit rate of project	125	0.625	14
Overhead percentage of project	111	0.555	44
Project design cost	118	0.59	31
material and equipment cost	116	0.58	35
Project overtime cost	117	0.585	32
Cost of rework	110	0.55	48
Design changes	111	0.555	44
<b>Time factors</b>			#N/A
Site preparation time	114	0.57	38
Planned time for construction	112	0.56	42
Average delay in claim approval	110	0.55	48
Average delay in regular payments	105	0.525	56
Unavailability of resources	113	0.565	40
<b>Quality factors</b>			#N/A
Conformance to specification	112	0.56	42
Unavailability of competent staff	110	0.55	48
Quality of equipment and raw materials	124	0.62	17
Quality training/meeting	121	0.605	26
Availability of experience persons	123	0.615	19
<b>Productivity factors</b>			#N/A
Project complexity	128	0.64	7
Number of new projects / year	123	0.615	19
Absenteeism rate through project	111	0.555	44

Management-labour relationship	131	0.655	3
Sequencing of work according to schedule	129	0.645	4
<b>Project Management Actions Factors</b>			#N/A
Communication systems	122	0.61	23
Planning effort	129	0.645	4
Implication an effective quality assurance	124	0.62	17
Overall managerial actions	122	0.61	23
Control sub contractors	128	0.64	7
<b>Client satisfaction factors</b>			#N/A
Information coordination between owner and project parties	126	0.63	11
Leadership skills for project manager	134	0.67	1
Speed and reliability of service to owner	133	0.665	2
Number of disputes between owner and project parties	126	0.63	11
Number of rework incidents	109	0.545	52
<b>Community Satisfaction Factors</b>			#N/A
Quality of regular documents	125	0.625	14
Neighbours and site condition problems	107	0.535	55
Compliance to regular documents	111	0.555	44
Non compliance to regular documents	117	0.585	32
<b>People factors</b>			#N/A
Employee attitudes	119	0.595	28
Recruitment and competence development	113	0.565	40
Employees motivation	125	0.625	14
Belonging to work	121	0.605	26
<b>Health and safety factors</b>			#N/A
Application of health and safety factors in organization	129	0.645	4
Project location is safe to reach	123	0.615	19
Easiness to reach site	119	0.595	28
Reportable accidents rate in project	109	0.545	52
Assurance rate of project	117	0.585	32

<b>Innovation and learning factors</b>			#N/A
Learning from own experience and past history	115	0.575	36
Learning from best practice and experience of others	128	0.64	7
Training HR	114	0.57	38
Coordination	119	0.595	28
Review of failures and solving them	123	0.615	19
<b>Environmental factors</b>			#N/A
Air quality	128	0.64	7
Noise level	110	0.55	48
Wastes around the site	109	0.545	52
Climate condition	126	0.63	11

The List of All Factors Affecting Performance Of Constructions And Respondent With The Relative Importance Index And Rank. All Feedback From Respondent Tabulated And Tries To Find Out Critical Factors Which Severely Affect Of The Performance Of Constructions Industry. The Perspective Of Each Respondent Is Different From Each Other And Therefore Result Are Obtained From Respondent Vary from Each Other.

#### 4.2.2 Group category wise performance of constructions projects rank

**Table -3: Analysis of all Group Category wise Factor and Gives Rank**

<b>GROUP FACTOR</b>			
<b>CATEGORY</b>	<b>ΣW</b>	<b>RII</b>	<b>RANK</b>
Quality factors	132	0.66	1
Project Management Actions Factors	131	0.655	2
Community Satisfaction Factors	130	0.65	3
Health and safety factors	130	0.65	4
Time factors	128	0.64	5
Client satisfaction factors	123	0.615	6
Cost Related Factors	120	0.6	7
Environmental factors	120	0.6	8
People factors	120	0.6	9
Productivity factors	118	0.59	10
Innovation and learning factors	116	0.58	11

#### 4.2.3 Top 10 factors affecting project Performance

**Table- 4: Top 10 factors affecting project Performance**

<b>FACTOR</b>	<b>ΣW</b>	<b>RII</b>	<b>RANK</b>
<b>Leadership skills for project manager</b>	134	0.67	1
<b>Speed and reliability of service to owner</b>	133	0.665	2
<b>Management-labour relationship</b>	131	0.655	3
<b>Sequencing of work according to schedule</b>	129	0.645	4
<b>Planning effort</b>	129	0.645	5
<b>Application of health and safety factors in organization</b>	129	0.645	6
<b>Project complexity</b>	128	0.64	7
<b>Control sub contractors</b>	128	0.64	8
<b>Learning from best practice and experience of others</b>	128	0.64	9
<b>Air quality</b>	128	0.64	10

### 5. CONCLUSION

The Construction Industry Is Considered As An Important Sector In The World As It Developing And Achieves The Goals Of Society. The Performance Of The Constructions Industry Is Affected By The Clients, Contractors, Consultants, Stakeholders, Regulators, National Economies And Others. In This Thesis Work First To Identifying The Factors Affecting The Performance Of Constructions Projects In The Region Of Ahmedabad And Also Analyze The Factors By Relative Important Index Method. The Top Most Factor Rank And Also Recommended. The Aim Of This Research Is Broken Down Into The Following Objectives:

#### **To Determine the Factors Affecting the Performance of Constructions Projects in the region of Ahmedabad.**

A Structured Questionnaire Survey Approach Considered to Study the Impact of Various Attribute and Factors Affecting Constructions Projects performance. The questionnaire assists to study the attitude of owners, consultants and contractors towards key performance indicators in the construction industry. These questionnaires were distributed to expert engineers such as projects managers, site engineers/office engineers and organizations managers. They have a some strong practical experience in the construction industry field. Their sufficient experiences are a suitable indication for this study. Fifty Seven factors were considered in this study and were listed under eleven groups

based on literature review. These groups gave a comprehensive summary of the main performance indicators. The main groups considered in this thesis are Cost, time, quality, productivity, client satisfaction, Project Management Action, Health and Safety, Innovation and Learning, community satisfaction, people, and environment. The target groups in this research were owners, Engineer and contractors. 40 questionnaires were distributed And Respond were received as follows: 3 (8%) from Academician, 22(55%) from Engineer and 15 (37%) from contractors as respondents. The respondents were classified as projects managers, site engineers/office engineers and organizations managers, as they have a practical experience in construction industries field. Their experiences included many construction fields such as buildings, Industries, roads and transportations, and water and sewage projects.

## 6. RECOMMENDATIONS

[1] Leadership skills for project manager this factor is the most important one for contractors Owner and Consultant because leadership skills for project manager affect the construction contractor's performance. This factor is an important for contractors because it is significant for effectiveness on project performance.

[2] Management-labor relationship can assist for strong coordination and motivation between contractor level and consultant level. This will lead to implement project with success supervision and so good performance of consultant. The management labor relationship is significant for productivity performance of construction projects.

[3] Sequencing of work according to schedule In This factor is the most important one for contractors because sequencing of work according to schedule assists contractors to implement project according to scheduled time for project completion. The contractors will not suffer from time and cost performance problems. The sequencing of work affects the productivity performance of Project.

[4] Planning Effort is Main Factor in Project Initial stage and Also Time consuming. This factor is not improve but time is reduce and also mitigate.

[5] Health and safety factor most important factor in project because the labour is most important in construction project, so the safety related all equipment should be proper arranging for labour and also other staff and safety related awareness and arrange seminar also provide proper healthy environment.

[6] Project complexity affects the degree of overall performance through project. This factor is not important for owners. This might be due to different locations and projects types.

[7] The sub contractor work is reduce and also Control Because under the sub contractor work may be not Perform very well and also Work in Reduce Quality.

[8] Learning for other and also best practice is also important factor in construction so the planning engineer is most experience and improve skill in estimation and also future design. the site engineer is best practice for the site and Improve site proper knowledge and also quality engineer perform his duty very well and get best practice and knowledge.

[9] Air quality affects the health, safety and productivity performance. Quality affects strongly the performance of project Some Times Different Project location and Environment.

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