

## GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES MITIGATION TECHNIQUES TO IMPROVE SHORTAGE OF SKILLED LABOUR IN MUMBAI, CONSTRUCTION INDUSTRY

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### ABSTRACT

The Construction industry is rapidly growing industry in India with large ongoing project also every construction projects runs with multi-tasking activities .to carrying out these activities effective construction worker are working. Today's competition in the industry and this heavy workload is responsible to put great demand on employees. The objectives of this study are to find the causes for the shortage of skilled labour in the Mumbai, construction industry, the subsequent effects due to the shortage and to derived up with effective mitigation measures. The investigation was shown via two types of questionnaire surveys; pointing Planners, Engineers, Managers, Technical Officers and other comparable grades. As well as pointing skilled labours Included skilled labour types were: bar bender, carpenter, concrete worker, mason, electrician's, painter, plasterer, pipe fitter, stuffer, and tiler. Mean method was applied for the ranking of reasons and opposing effects as well as data analysis using the Microsoft Excel. Change in technologies / change in education system effect on the labour as well as Lack of vocational educations on labour major reason for shortage of skilled labour it is attempted in Mumbai, construction industry, then arranging different suitable mitigation measure to overcome the issue.

**Keywords :**Construction Industry, Effects, Mitigation Measures and Skilled Labour.

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### I. INTRODUCTION

India has second largest construction industry in the world. Quality of skill of labour is not satisfactory. Construction field is getting more essential around the world. Problem of skill labour shortage has bringing lots of consequences and economy [1]. The foremost effects such as construction expenses rise, quality of works and the speediness of construction will be arising down.

An earlier study is on tasks faced by construction trade concludes that skills drain and lack of labours as a recognized problem in construction trade [1]. Investigators in Mumbai and additional developed countries who analysed the sources of delays in the construction projects identified "shortage of skilled labour" as a vital fundamental factor [6]. Construction is a labour-intensive trade, which sure of deeply on the skills of its labour power. The unbalanced level of activity in the industry causes severe variations in man power requirements, which in turn results in labour excess and shortages from time to time. While there is a want to carry out extra research to study about the lack of skilled labour and in what way to face it, especially after the end of the civil conflict with the probable rapid growth rate of construction industry [7], In Mumbai, the construction industry plays a main role in financial and physical development. The construction trade is deeply dependent on the adequate supply of expert labour, and as a result, the skilled labour lack in Mumbai has received significant attention in current years. Hence, the study on the lack of expert labour in the construction trade of Mumbai is a vital and timely study for the industry.

## II. LITERATURE REVIEW

This review on literature in relation to skilled labour shortages its cause and effect on construction works as well as evaluation skilled labour shortages this as follows.

**Basnayake L.K. et.al., (2010)** in this paper to study about Sri Lanka skilled labour shortages. The study concentrating on the details for the trained labour lack, the penalties of skilled labour lack, and then use suitable mitigation methods to overcome the skills shortage. A questionnaire survey is conducted to collected data within the both private and public construction organizations to analyze the views of professionals' as well as labourers and to find out sources as well their consequence and impact for the lack of skilled labour in construction industry of Sri Lanka. Insufficient of skilled labour from training organizations was found as the main motive for lack of skilled labour in construction trade and the poor quality of works was recognized as the major effect then arranging by seminar as well as training concluded was found as the exact mitigation measure to overcome the problem.

**Dr. Abiola-F et.al., (2011)** in this paper to study aim at evaluating the current state of the construction industry's skilled labor force, reasons, influence of the skilled labour lack and the effect in skilled labour deficiency in construction project. The information together was analyzing by Frequency tables, percentages, mean response analysis, cross tabulation and relative importance index. Than study found that construction project is not transfer their skilled labours force for training, and that the skilled labours are loath to mention the job to their offspring. The investigation open that the construction firms were recompensing extra money for labours, and Plan delay in their construction programmes as a outcome of skilled labour lacks. The study found old labours force in the construction trades sampled, and by thought of new publics into the construction sectors was very low.

**Zakaria Yusof et.al., (2012)** this paper finds out construction skilled lack problem in Malaysia and how grave it is. Conversation of the paper on initiatives taken to decrease this problem by presented technical as well as vocational skills exercise and education in Malaysia such as National Occupational Skills Standards as well as National Dual Training System. Those creativities will be conversed and related. Furthermore, success factor of double scheme will also be conversed which are based from other country that magnificently implement double scheme. In that NDTTS application is successful, it can help to reducing the mismatch problem of quality and quantity of skilled labours, bond the skill gap between industry and organization, decreasing dependence on migrant workers, and technology transmission to skilled labours, training institute and industrial society.

**Henny Pratiwi Adi et.al., (2012)** the investigation purposed to progress skills level extent of construction labours in respectively of the trades. This scheme is going to be used observations and discussion. The information found will be used to relating Malaysian construction expertise standard and Indonesian construction expertise standard. then a prototypical of skill standard is going to feature define skill in respectively of trade in a way that is extensively predictable and with practices for training as well as certification. national occupational analysis that observed the construction subdivision council of Canada will be useful. The complete objective of this investigation is to improve labours skills standard in respectively of the field by relating skill standard in Malaysia and Indonesia. Than lastly, to achieve Indonesia is the major country who transfer construction labor in Malaysia. The Indonesian construction workers in Malaysia remained generally unskilled as well as semi-skilled workers. The maximum trades of Indonesian construction labour in Malaysia are as follows bricklayers, carpenters, plasterers, plumbers, and painters. Development of labour skill level will increase to income rate. Development of skill level must be modified from skill condition in Malaysia. Equation of observation of members in construction labour market is very vital to equilibriums between accessibility and necessity of skills labour.

**Mr. R. Praveen et.al., (2013)** in this paper study examining the condition of the construction sector in Sri Lanka with respect to skilled labourer by evaluating the necessity to rise the number of skilled workers and their skill level by recognizing the reasons as well as their effects of the lack of skilled labour. This paper was directed by dual types of questionnaire surveys, i.e.; the separate surveys and the organized surveys between consultants, clients and contractors, represented by Engineers, Architects, Technical Officers, Quantity Surveyors, and further like grades. In this paper the "Significance Index" used to ranking causes and effects and the "Importance Index" used to find

out vital mitigation measures. According by the investigations, the recent lack of concrete workforces as well as masons are 70% and 67% respectively. This paper précises the consequences of a survey directed in Sri Lanka and propose mitigation measures to overcome the issue.

The gray area identified by the study of literature review is as follows

- Researcher had study about reasons, effect and impact on construction industry due to shortage of skill labour.
- Researcher has only use Training workers and seminar to overcome the shortage of skilled labour.

### III. RESEARCH METHODOLOGY

After carried out literature review, understand various direct and indirect impacts on construction industry due to skilled labour shortages. Then to find out this impact on construction industry to carried out questionnaire survey.

#### 3.1 Questionnaire survey

Questionnaire survey has been conducted by two ways

A sample of 50 construction firm was selected as well as 16 questions of 8-8 question of each survey. To list down the probable fundamental reasons, effects and mitigation measures, expert concepts from some academics and industry specialists were used. Additional, few faces to face discussions were conducted with skilled labours and to find out the above factors. Involved skilled labours categories were: bar bender, electrician, carpenter, concrete worker, painter, plasterer, plumber, fitter, scaffolder and tiler. To inspire the labours psychologically to reply the questionnaire and thus to rising the response rate, several techniques were adopting i.e. For example, unnecessary questions that enquiry more into personal matters about both respondent and company were avoided. The investigation was conducting by February 2018 to April 2018. The respondents included

- Small scale construction firms
- Large scale construction firms
- Minor works contractor and consultants.

The questionnaire was conducted 25 construction firms hard copy of questionnaire and taking face to face interviews in labours. Questionnaire was addressed to 25 Managers/ Engineers/ surveyor/ safety supervisors and 25 labours including bar bender, carpenter, concrete worker, electrician, mason, painter, plasterer, plumber/pipe fitter, stuttrer, scaffolder and tiler.

Questionnaire survey conducted basically focusing about following area.

#### Questionnaire A- Managerial and Engineer Level

1. Information approximately the organization
2. Background Information
3. Identification of the consequences of the shortage of skilled labour
4. Identification of the reasons for a shortage of skilled labour

Managerial and engineer level questionnaire based on five-point Likert scale system such as follows

- 1- Very High
- 2-Above Average
- 3- Average
- 4-Below Average
- 5-Very Low

#### Questionnaire B- Labour level

1. Type of job and work experience
2. Basic personal details
3. Training and educational experiences
4. Job satisfaction
5. Future Plans with the job.

Labour level questionnaire based on five-point Likert scale system.

- 1- Strongly agree
- 2- Agree
- 3- Neither agree or disagree
- 4-Disagree
- 5-Strongly disagree

### 3.2 Statistics Analysis

Statistical analysis was performed by utilizing the MS Excel 2016. Data description was conducted mainly by MS Excel 2016. Fundamental data description and analysis will be discussed. All the values or votes were put in the new excel sheet one by one. Then the built-in formula in excel were used to calculate total score of the votes and finally means were calculated. Same procedure was followed for all the 16 questions.

To finding out rank of given factor by using mean method. The values in total score of rating were obtained by multiplying all the votes with their respective rank and then adding them. Total score is divided by total no of respondents to find out mean. The formula used to find out mean of the scores is as follows and then mean was calculated: (Number of reopens /votes × Weighting of column 1) + (Number of reopens /votes × Weighting of column 1-1) + Number of reopens /votes × Weighting of Column 1-2) + (Number reopens /votes × Weighting of column 1-3) +... / Total Number of reopens /votes

(Source: **Research Methodology: Methods and Techniques, C. R. Kothari**)

$$F = \frac{a \times n + b \times (n-1) + c \times (n-2) \dots}{N}$$

- Where a = No. of votes in Rank 1  
 b = No. of votes in Rank 2  
 c = No. of votes in Rank 3 and so on .....  
 n = Weighting for Column  
 N = Total no. of votes or response.

The one with highest mean score is selected as Rank 1 and one with least mean score is selected as Rank 8 on about total 8 questions of each. On that Score of rating 1 for the most important reason of skill labour shortages occur and the least will be 8. (Table 1, 2, 3 and 4)

For example, to calculations of rank 1 by mean method

$$F1 = \frac{4 \times 5 + 9 \times 4 + 6 \times 3 + 6 \times 2 + 0 \times 1}{25} = \frac{86}{25} = 3.44$$

In that mean 3.44 higher than other than its gives rank 1 shown table 3

**Table 1 Causal Factors responses manager and engineer of Shortage of Skilled Labour (Questionnaire A)**

| Scale / Managerial and Engineer Level questions (casual factors)                            | Very High | Above Average | Average | Below Average | Very Low | Total Responses |
|---------------------------------------------------------------------------------------------|-----------|---------------|---------|---------------|----------|-----------------|
| Skill labours are recruiting as employee's trainee apprenticeship from Training Institutes. | 2         | 5             | 6       | 6             | 6        | 25              |
| Quality of skill available in labour force.                                                 | 0         | 6             | 8       | 4             | 1        | 25              |
| Quality of training institutes provided to employees.                                       | 2         | 4             | 8       | 10            | 7        | 25              |
| Change in technologies / change in education system effect on the labour.                   | 4         | 9             | 6       | 6             | 0        | 25              |
| Percentages skill labour shifting to another field.                                         | 0         | 7             | 7       | 3             | 8        | 25              |
| Labours Change their profession due to variation in wages.                                  | 5         | 7             | 1       | 8             | 4        | 25              |
| Effect of influences of unskill labour on organization.                                     | 2         | 3             | 8       | 6             | 6        | 25              |
| Efficiency of worker changing with respect to changing environment condition on site.       | 1         | 7             | 5       | 10            | 2        | 25              |

**Table 2 Causal Factors responses labours of Shortage of Skilled Labour (Questionnaire B)**

| Scale / Labours level questions (casual factors) | Strongly agree | Agree | Neither agree or disagree | Disagree | Strongly disagree | Total Responses |
|--------------------------------------------------|----------------|-------|---------------------------|----------|-------------------|-----------------|
| Felling overstress due to overtime of work       | 6              | 11    | 0                         | 6        | 2                 | 25              |
| Don't get enough holiday.                        | 7              | 11    | 0                         | 3        | 4                 | 25              |

|                                                                  |   |    |    |    |   |    |
|------------------------------------------------------------------|---|----|----|----|---|----|
| Health and work is affected by environment.                      | 3 | 11 | 6  | 3  | 2 | 25 |
| Tool and equipment shortages which reduces productivity of work. | 4 | 7  | 0  | 14 | 0 | 25 |
| Lack of vocational educations.                                   | 5 | 15 | 1  | 2  | 2 | 25 |
| Confusion due to variety of works.                               | 7 | 8  | 0  | 7  | 3 | 25 |
| Career development is not enough on this work.                   | 0 | 2  | 16 | 5  | 2 | 25 |
| Communication between supervisors and you is not well.           | 0 | 0  | 1  | 15 | 9 | 25 |

*Table 3 Ranking Distribution of Causal Factors responses manager and engineer of Shortage of Skilled Labour (Questionnaire A) in Rank 1-8*

| Casual Factors                                                                              | Total scores of Rating | Mean scores of Rating | Ranking  |
|---------------------------------------------------------------------------------------------|------------------------|-----------------------|----------|
| Skill labours are recruiting as employee's trainee apprenticeship from Training Institutes. | 66                     | 2.64                  | <b>5</b> |
| Quality of skill available in labour force.                                                 | 69                     | 2.76                  | <b>4</b> |
| Quality of training institutes provided to employees.                                       | 65                     | 2.6                   | <b>6</b> |
| Change in technologies / change in education system effect on the labour.                   | 86                     | 3.44                  | <b>1</b> |
| Percentages skill labour shifting to another field.                                         | 63                     | 2.52                  | <b>8</b> |
| Labours Change their profession due to variation in wages.                                  | 76                     | 3.04                  | <b>2</b> |
| Effect of influences of unskill labour on organization.                                     | 64                     | 2.56                  | <b>7</b> |
| Efficiency of worker changing with respect to changing environment condition on site.       | 70                     | 2.8                   | <b>3</b> |

*Table 4 Ranking Distribution of Causal Factors responses labours of Shortage of Skilled Labour (Questionnaire B) in Rank 1-8*

| Casual Factors                                                   | Total scores of Rating | Mean scores of Rating | Ranking  |
|------------------------------------------------------------------|------------------------|-----------------------|----------|
| Felling overstress due to overtime of work                       | 88                     | 3.52                  | <b>3</b> |
| Don't get enough holiday.                                        | 89                     | 3.56                  | <b>2</b> |
| Health and work is affected by environment.                      | 85                     | 3.4                   | <b>4</b> |
| Tool and equipment shortages which reduces productivity of work. | 76                     | 3.04                  | <b>6</b> |
| Lack of vocational educations.                                   | 94                     | 3.76                  | <b>1</b> |
| Confusion due to variety of works.                               | 84                     | 3.36                  | <b>5</b> |
| Career development is not enough on this work.                   | 68                     | 2.72                  | <b>7</b> |
| Communication between supervisors and you is not well.           | 42                     | 1.68                  | <b>6</b> |

#### IV. RESULTS AND DISCUSSION

##### 4.1 Results and Discussion of Questionnaire A

Table 3 shows the detail analysis of the responds given by each category for each sub section of the questionnaire. Moreover, the responds given were ranked to find out the most important factors under each sub sections. All those findings were analyzed as a whole in order to have a general idea about each major issue addressed through the questionnaire. The summary reply of the respondents is tabularized below against top five ranks.

*Table 5 Summary of causal factors according to overall view of table 3*

|   |                                                                                            |
|---|--------------------------------------------------------------------------------------------|
| 1 | Change in technologies / change in education system effect on the labour                   |
| 2 | Labours Change their profession due to variation in wages                                  |
| 3 | Efficiency of worker changing with respect to changing environment condition on site       |
| 4 | Quality of skill available in labour force                                                 |
| 5 | Skill labours are recruiting as employee's trainee apprenticeship from Training Institutes |

On this summary to show the main causes of skill labour shortage occurs due to Change in technologies / change in education system, Labours Change their profession, Due to variation in environmental situations, Insufficient supply of skilled labour from training organizations as well as Insufficiency of skills in the presented labour force by overviewing all the response of respondent.

#### 4.2 Results and Discussion of Questionnaire B

Table 4 shows the detail analysis of the responds given by each category for each sub section of the questionnaire. The summary reply of the respondents is tabularized below against top five ranks.

**Table 5 Summary of causal factors according to overall view of table 4**

|   |                                             |
|---|---------------------------------------------|
| 1 | Lack of vocational educations.              |
| 2 | Don't get enough holiday.                   |
| 3 | Felling overstress due to overtime of work. |
| 4 | Health and work is affected by environment. |
| 5 | Confusion due to variety of works.          |

On this above summary to show main reasons shortage of skill labour i.e. change the field labour due to lack of vocational educations i.e. lack of skill-based educations, don't get enough holiday on construction site, felling overstress due to overtime of work, health and work is affected by environment as well as due to confusion of variety of work.

#### V. CONCLUSION

According to the analysis overview the all this reason skill labour shortages by manager and engineer point of view is as follows Change in technologies / change in education system, Labours Change their profession, Due to variation in environmental situations, Insufficient supply of skilled labour from training organizations as well as Insufficiency of skills in the presented labour force. And in labours point of view is as follows change the field labour due to lack of vocational educations i.e. lack of skill-based educations, don't get enough holiday on construction site, felling overstress due to overtime of work, health and work is affected by environment as well as due to confusion of variety of work. On this issue by

Recommending of different mitigations techniques is as follows

##### **Mitigation Measures to overcome the shortage skilled labour**

1. Arrange seminar/training/conferences programmes on training organizations.
2. Generating a healthy and safe working atmosphere on working site.
3. Increase the supply of skilled worker on training organizations.
4. Rising salaries / Wages of labours.
5. Afford an appropriate certificate of service at the end of finish of service evaluating the level of capabilities such that they can present it anywhere else as a legal certificate about his skills.
6. Conduct yearly investigation to display the demand and supply of skilled labours.
7. Evaluate the level of skills of Labourers and offer a grading system to inspire them psychologically to gain skills.
8. Advance the skills of the labours at the company level done proper internal training.
9. Conduct yearly surveys on movements of labour market, recognize the capabilities required by the labours in recent industry and rearrange the format of training programmes consequently.
10. Well co-ordination as well as communiqué among training organizations.
11. Creation regulations on the least number of skilled labour and their capabilities working in a construction project built on the size of scheme.
12. Significant a lowest ratio of skilled labour to untrained labour liable on the nature of work.

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