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# Skilled Labor Shortage and Workforce Development For Infrastructure Projects

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#### ABSTRACT

The shortage of skilled labor refers to the lack of workforce in certain trades or the absence of individuals possessing the necessary skills. This paper aims to pinpoint the areas experiencing skilled labor shortages within the building construction sector. A survey research methodology was utilized to gather data from a study population that included project managers, site engineers, site foremen, and engineers employed by contractors. Questionnaires were crafted in alignment with the specific objectives of the research and served as the primary tool for data collection. The study's findings indicated that the deficit of skilled workers was particularly evident among painters and decorators, electricians, and tile workers. Additionally, the research identified that the skilled labor shortage was influenced by socio-economic factors, external pressures, the appeal of jobs, job characteristics, job satisfaction, limitations within the industry, and personal circumstances. It is recommended that employees be motivated to enhance their trade skills and adopt a more positive work attitude, while employers should focus on strengthening their workforce through training initiatives.

Keywords: Skilled labour shortage, Workforce deficit, Building construction sector, Workforce development,

#### **1. Introduction**

The construction industry functions on a global level and is well-known for its ability to generate job opportunities across a range of skill sets and professions. At present, the estimated output value of the global market stands at around \$1.5 trillion. Nevertheless, only a small portion of this wealth is directed towards the workforce. It is estimated that there are more than 100 million construction workers globally, accounting for approximately 6-7% of the worldwide labor force. Although India is recognized for its swift economic growth, it has not seen a parallel advancement in social development. The country faces considerable challenges, including poverty, unemployment, and inequality, particularly in terms of equity and social progress. A significant portion of India's labor force is marked by informality, skill deficiencies, low wages, reduced productivity, and inadequate protections. Within the larger segment of unorganized labor, construction workers form a significant demographic that suffers from poor working conditions and unfavorable employment terms. Currently, the Indian construction sector is experiencing a severe shortage of skilled labor. This study utilizes a methodology that encompasses a thorough literature review to evaluate the existing state of skilled labor shortages, followed by a questionnaire and interview survey conducted among both private and public construction firms to gather insights from professionals and laborers. The main objective is to analyze the data collected and propose effective strategies and solutions to tackle the challenges arising from the shortage of skilled labor. The Indian Construction Sector - The construction industry is recognized as one of the fastest-growing sectors of the 21st century, especially flourishing in developing countries. By 2024, India is anticipated to become the third-largest construction market globally. This sector is essential for both economic and infrastructural development in India, ranking as the second most important sector in the economy after agriculture. It employs over 51 million people, with around 90% involved in on-site construction work, while the remaining 10% concentrate on finishing tasks such as painting, plumbing, and electrical installations. The construction industry accounts for nearly 9 % of India's Gross Domestic Product (GDP) and, due to its labor-intensive nature, has significantly contributed to alleviating national unemployment issues. Nevertheless, recent technological advancements and innovations are reshaping the sector into a more technologically advanced environment, particularly in the housing sector, facilitating the construction of skyscrapers and high-rise buildings. This transition has made the industry increasingly profit-oriented, though it comes with considerable risks and limited prospects for labor, particularly for unskilled and semi-skilled workers. While the availability of unskilled labor is projected to increase, the shortage of high-quality skills in the labor market is becoming more pronounced, intensifying the challenge of skilled labor shortages throughout the country. Labor is an essential asset in the construction sector, as it unifies all other resources, such as materials, equipment, and financial capital, to produce various construction outcomes. It is the only resource that affects all others and is especially open to improvements. Market competition usually dictates specifications, material management, costs, profits, and overheads, leaving labor as the main resource for enhancement. The Bureau of Labor Statistics indicates that construction workers participate in a wide range of physically demanding tasks on-site. The nature of construction work is inherently rigorous. Construction laborers often work at considerable heights and frequently put in extended hours, including weekends, holidays, and night shifts. Work may be disrupted by unfavorable weather conditions, during which workers typically do not receive pay. Furthermore, laborers operate hazardous machinery, work at high elevations, and handle dangerous materials.

#### 2. Literature Review

The challenge of skilled labor shortages has been acknowledged and studied by many researchers, highlighting it as a critical and growing concern in the construction industry that has received considerable focus in recent years. This discussion pertains to the various research initiatives aimed at alleviating the skilled labor deficit in the construction sector. The review includes insights from both national and international viewpoints on the issue. A number of papers and reports are examined as outlined in the subsequent sections. Giorgio Brunello (16-OCT-2021) identified multiple methodologies for evaluating skill mismatch, which produce notably different results. Self-reported data approaches suggest a much lower percentage of well-matched individuals in contrast to statistical methods that assess individual skills relative to the average skill level in a specific occupation. Ms. Sovitha Varadarajah (February 2020) stated that the application of SPSS for the analysis of skilled labor is a crucial and vital component of the construction industry. The shortage of skilled labor presents a major challenge in this field. This study explores the reasons, effects, and possible remedies related to the problem of 'skilled labor shortage in the construction industry.' A questionnaire was distributed among 30 construction firms, encompassing a total of 157 companies in Batticaloa. The gathered data were evaluated using ranking software. Thwala, W.D. (April 23, 2009) noted that the ongoing shortage of skilled labor poses a considerable challenge for the construction sector, with many contractors experiencing significant losses in both time and financial resources. Biren Patel, Prof. J.J. Bhavsar, and Dr. Jayeshkumar Pitroda (April 2017) indicated that key factors affecting labor productivity in the central Gujarat region include insufficient compensation, poor construction practices, the level of technological adoption and mechanization, as well as delays in material delivery, among other challenges. According to Anthony D. Azar, Constantin Militaru, and Claudia P. Matter (August 8, 2018), the study indicates that the identified factors are crucial elements contributing to the skill shortage in the construction sector, which subsequently impacts the overall project performance. Additionally, Mario Galic (January 2, 2021) highlighted that the policy of open borders, the challenges of an aging population, the expansion of various industries, and the economic disparities among EU Member States are important considerations. Each Member State has its own regulatory framework for labor markets; however, there are ongoing reports of labor shortages across these countries. To mitigate these issues, it is vital to either import a skilled workforce from third countries or to promote the free movement of workers within the EU.

#### 3. Objectives of study

- 1. To assess the shortage of qualified professionals in the construction industry.
- 2. To inspire the youth to participate in the construction field and to urge contractors to provide training for workers.
- 3. To encourage trained and skilled laborers who are ready for alternative career paths.

4. To evaluate the existing workforce development framework and examine best practices in workforce development, suggesting policies to create an efficient workforce development system.

#### 4. Methodology

The methodology outlined below will be implemented:

- •Gathering and analyzing preliminary data to understand the current situation regarding the shortage of skilled labor through a review of existing literature.
- •Developing two distinct questionnaires, one aimed at administrative and professional personnel and the other directed towards laborers.
- •Collecting data via a semi-structured interview survey based on the questionnaires.

•Evaluating the data using analytical techniques to identify the causes of the skilled labor shortage and its effects on the construction sector. •Recommending effective strategies and mitigation measures to address the issue.

•Providing a comprehensive conclusion and recommendations derived from the methodology.

This extensive research employed a qualitative methodology, conducted across various construction sites in India—one site utilizing skilled labor and the other depending on unskilled labor. Data was meticulously collected through personal interviews, observations, and documentation. A comparative analysis was executed to identify differences in productivity, work quality, project costs, and timelines among the sites. These distinctions are categorized according to the level of skill and expertise required for the tasks undertaken.

Training must be carried out in a structured manner to achieve the desired outcomes. The training framework consists of four phases:

- 1. Identifying the needs for training and development programs.
- 2. Creating the training and development programs.
- 3. Executing the training program.

#### 4. Assessing the effectiveness of the training program.

#### 5. Scope of study

A standard civil engineering construction project is expected to meet the client's expectations concerning cost, time, and quality, which are heavily reliant on the performance of the workforce involved. The efficiency of the workforce is largely determined by their training and expertise. Although many prior studies have pointed out the shortage of skilled labor as a significant challenge adversely affecting the construction industry both locally and globally, there has been a scarcity of research focused on analyzing this issue to formulate effective solutions. Consequently, this study aims to fill the gaps identified in previous research and suggest practical strategies to alleviate the impact of skilled labor shortages in the construction industry. Data was collected from various private sector entities, including clients, contractors, and consultants.

#### 6. Suggestions

In order to tackle the issues related to labor shortages and improve workforce quality, the establishment of vocational skill development programs for both on-site and off-site training is highly effective in developing a multi-skilled labor force and enhancing overall productivity. These training programs should focus on unskilled workers, aligning their skills with industry hiring standards, while also facilitating the advancement of skilled workers into multi-skilled positions to encourage cost efficiency and a wider knowledge base within the workforce. Moreover, collaborative training initiatives will play a crucial role in building strong relationships between stakeholders and training organizations, thereby promoting mutual support and serving shared interests. Additionally, it is crucial to attract younger individuals to the construction sector by enhancing its public perception.

#### 7. Results

The study's findings indicate that labor in construction projects is crucial for successful and timely project completion, while also highlighting the negative impacts of unskilled labor in the construction industry.

- 1. Majority (31 %) of the respondent's age are 18 25 years.
- 2. Majority (28 %) of respondents of more than 20 years' experience in construction industry.
- 3. Majority (38 %) of the respondents are project manager.
- 4. Majority (40 %) of the respondents are more than 40 skilled workers working at site.
- 5. Majority (43 %) of respondent's i.e skilled workers are present at site.
- 6. Majority (80 %) of respondents have experienced shortage of skilled labors at site.
- 7. Majority (90 %) of respondents has the labor shortage affected work in terms of timely completion.
- 8. Majority (68 %) of respondents think technology has affected scarcity of labors.
- 9. Majority (61 %) of respondent both class i.e skilled and unskilled class of labor scarcity affects any work.
- 10. Majority (54 %) of respondent use his skillset and train the new workers under them should a skilled labor play in construction company.
- 11. Majority (63 %) of respondent i.e young willing generation is skill shortage in construction industry.
- 12. Majority (84 %) of respondents makes project more expensive and takes longer time to complete labor shortage affect construction industry.
- 13. Majority (52 %) of respondent are outsource the work to other petty contractor retain construction project when there is labor shortage.
- 14. Majority (65 % ) of respondent impart separate training to the unskilled workers .
- 15. Majority (45 %) of respondent say yes it is possible to provide work life balance to workers.
- 16. Majority (45 %) of respondent have inadequate salary is the one of the direct reason of skill shortage in Indian construction industry.
- 17. Majority (49 %) of respondent i.e lower productivity from unskilled workers hence skilled workers are preferred over unskillful workers by all company.
- 18. Majority (44 %) of respondent says lack of skill cause a problem for company for increase project time.
- 19. Majority (53 %) of Impart training to new worker can solve labor shortage problem.
- 20. Majority (50%) of respondent think usage of machineries, equipment and technologies have affected the labor shortages.
- 21. Majority (75%) of respondent think imparting training to unskilled workers is an option to create workforce.

- 22. Majority (69%) of respondent says adaptability and interest in learning both are the qualities needed to be learnt by the new generation for surviving in construction industry.
- 23. Majority (45%) of respondent think management will take risk of imparting training to workers in today's scenario.
- 24. Majority (66%) of respondent says without skilled labors, it is not possible to perform construction activities at all.
- 25. Majority (20%) respondent says provide training to new aged class of workers i.e effort can be taken to develop workforce.

#### 8. Conclusions

The study revealed several critical factors that hinder the performance of low-skilled workers, such as low wages, limited access to training facilities, a lack of incentive programs, concerns regarding safety and healthcare, and the absence of standardized pay scales for skilled labor. Furthermore, contractors frequently neglect to offer training for workers, and younger individuals are increasingly hesitant to pursue careers in construction. These challenges significantly contribute to the shortage of skilled labor, resulting in detrimental effects on the construction industry, including delays in project completion, budget overruns, and increased need for rework. Workforce development involves the recruitment, training, placement, and retention of individuals in meaningful jobs. In recent years, there has been a notable shortage of construction workers, making it progressively challenging to find skilled craft workers, which negatively impacts project schedules, financial plans, and safety protocols. As a nation, we have sufficient resources to tackle these issues. However, if we choose to remain inactive, the shortage of skilled professionals in the construction sector is likely to intensify, particularly as the workforce ages over the next decade.

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