

Shifting Foundations: Tackling the New Challenges in India's Evolving Construction Sector

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Abstract

Nearly 10% of India's GDP is based on construction activity. The projects like SMART CITIES are an asset for the economic growth of India through infrastructural projects. The construction industry depends on Human resources to a large extent. A cross-sectional study using by collecting opinions from 186 expert respondents in the construction sector was collected. 60% of the respondents were aged above 60. According to the study, construction companies are in need of skilled human resources with high proficiency of quality knowledge required for the industry. However, in the present scenario, only 4% of the labor population possesses the required skills and multi-tasking abilities. Worker absenteeism could be one of the main causes of the delay of any project and the reputation of the company. Multi-skilled potential workers who can tackle mass absenteeism in the construction workforce are in demand. Worker safety is a key concern in construction because accidents, injuries, and deaths are so common. The companies face legal hitches too. Often workers acquire ergonomic and other health-related problems due to the work nature or work environment. With the absence of an organized staffing process, only candidates quoting low wages are recruited. Resulting in low-quality products due to a lack of job talents and skills of construction laborers that did not fetch them many benefits and job security from employers. There exist low job satisfaction levels among employees and they correlate well with the high staff turnover

rate in companies annually which becomes the main cause for project failures. With frequent quitting, the experience gaining of workers suffers. Hence to avoid such challenges, a channelized unbiased staffing process with Technological interventions can help to a great extent to increase productivity, safety, and quality in the construction sector with frequent appropriate training as per need and requirement. Machination should be considered a supplement but not an alternative to replace human workers in the construction sector.

Keywords: GDP, Smart cities, labor absenteeism. Ergonomic, job quitting, training, Technological interventions

Introduction

The construction industry is 2nd largest employer and contributor to the nation's economic activity. 10% of India's GDP is based on construction activity. 50% of the demand for construction activity in India comes from the infrastructure sector, and the rest comes from industrial, residential, and other construction activities. The projects like SMART CITIES are an asset for the economic growth of India through infrastructural projects. The construction industry depends on Human resources to a large extent (Husseini, 1992; Hossein *et al.*, 2018). The availability of skilled manpower at different stages of construction is sometimes a concern (Shahid Hussain, *et al.*, 2020). Lack of training provided to the construction workers can hamper the timeline and quality of the construction. Focused attention is needed to speed up the skills and knowledge level of the workers. The above challenges have been impacting the progress of the construction industry in India. Worker safety is a key concern in construction because accidents and injuries are so common (Yiu, *et al.*, 2019). HR needs to make sure their company has all appropriate safety precautions in place and that workers follow them (Abdelhamid and Everett, 2000). Losing skilled workers in the middle of a project can leave a construction company unable to meet its project completion deadline. HR can develop incentives to keep them working until the project is finished and help them stay with the company for future projects. The COVID-19 pandemic demands that HR professionals stay up to date on the myriad safety regulations that apply to the construction industry and keep their organizations in compliance (Yiu and Chan, 2016). The need of the hour is to mitigate the challenges by introducing modernization and scaling up the labor force. For quality products, quality resources are a must. Similarly to accomplish successful quality projects and products, construction companies need skilled human resources with high proficiency in quality knowledge required for the industry (Raw A

Hijazi, 2021).. There are many risks of different natures in multiple levels associated with various sectors of the construction industry, which human resources are posed (Buniya, *et al.*, 2021). In the present scenario some of the existing challenges are listed below:

1. Lack of skills and job talents
2. No job satisfaction or job security and worker benefits
3. Health and life-threatening work nature
4. Tiresome and riskier job nature
5. Frequent Construction delays and Project failures
6. Training need and its lack in the present scenario
7. Need for technological innovations and digitalization

The task of analyzing the current problems and challenges are very important aspect in the present scenario for the successful completion of projects in the construction industry (Mondy, 2008). Knowledge gathering will help to fill the existing gaps and needs while framing policies and regulations for the betterment of the construction industry.

Methodology

Questionnaire preparation

The questionnaire is prepared and its reliability and validity have been thoroughly checked. The questions were also explicitly aimed at gathering information about participants' perceptions of the objectives framed. The questions have been set to measure the true unbiased opinions about the hypothesized statements to draw reliable conclusions based on careful analysis. The questionnaire consisted of two sections. Section 1 comprised general questions related to the age, designation, and experience of the respondents. Section 2 covered the study objective based on specific questions. The questions were directed to receive opinions about the prospects and importance of HR in the construction sector, workers' job satisfaction, worker benefits, recruitment process, training needs, project failures and reasons, and health and safety levels. Under each lead, many sub-questions were put to achieve optimized and nearly accurate responses.

Determination of sample size

Data will be collected from Members of the Construction Development Council, State level Regulating Associations, and the City chapters. The total population size of the respondents from all over the nation was 359 and a sample size of 186 samples was estimated by using a stratified

proportionate random sampling technique category. Each category is treated as a stratum and from each stratum, the sub-sample is calculated with a margin of error of 5% and 95% confidence level.

Results and Discussion:

1. General information collected from Section 1 Questionnaire

The 190 filled-up questionnaires received within the stipulated time were exactly sufficient for the reliable research analysis. From the results obtained, it was noted that 60% of the respondents were aged above 60. Only 10% of the respondents were found below the age group of 40 indicating that the construction company was functioning with senior citizens mostly who obviously should be well experienced in any decision-making process. The proportion of respondent types in the study is shown in Fig 1.

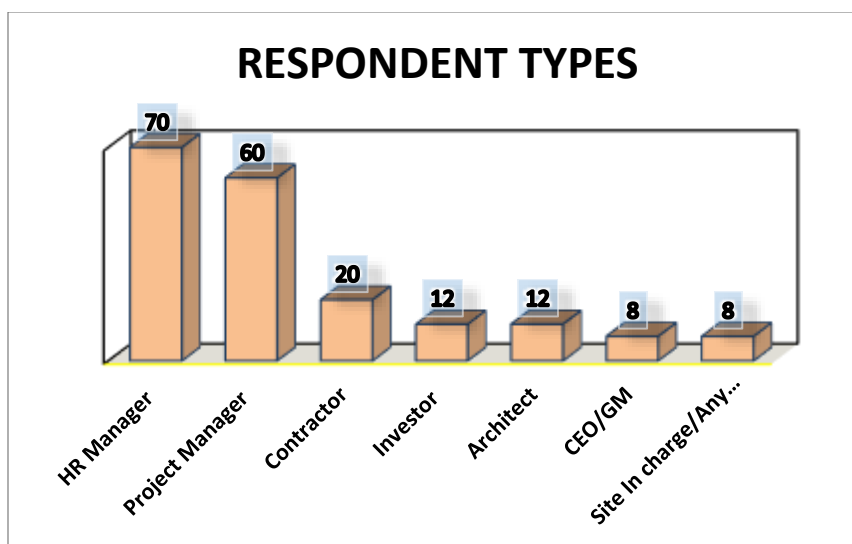
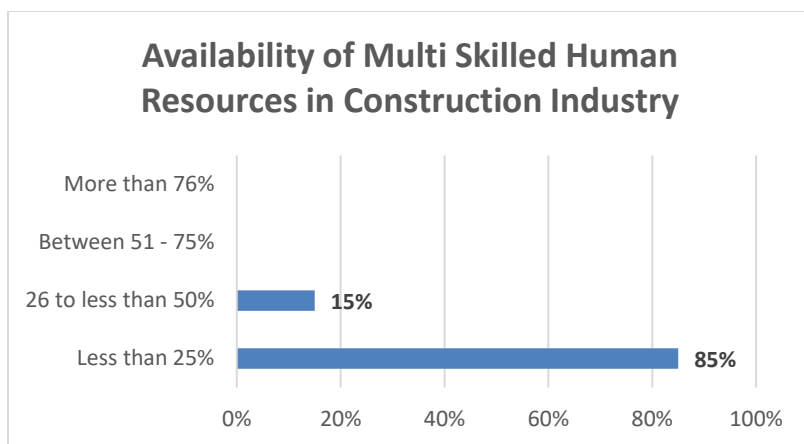


Fig 1: Respondent types of the study

1. Percentage of multi-skilled laborers working for your organization to manage absenteeism of a handful of other workers



From the results, the conclusion can be derived that most construction companies have only a minimum number of multi-skilled potential workers who can tackle mass absenteeism in the construction workforce. Worker absenteeism could be one of the main causes of the delay of any project and the reputation of the company (Reuben Mokwena Badubi, 2017). Hence managing worker absenteeism in the way it affects the construction process is something that needs consideration and demands attention and the companies should be efficient enough to recruit or replace multi-skilled workers to alleviate absenteeism problems in the construction process. From the response data, it is clear that only a few companies (15 %) have only or nearly a quarter of their worker population as multi-skilled roughly comprise only 4% of the total labor population. Hence there is a need for HR managers should understand the importance of recruiting potential candidates (Fraser, and Simkins, 2010). The selection process must include tests to judge and analyze the candidate's additional skills related to the construction process, including decision-making skills.

2. Worker job satisfaction analysis

S.No.	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	Your organization's employees are satisfied with the job pay	45%	25%	15%	13%	02%
2.	They stick on to a job until it is over	40%	20%	20%	10%	10%
3.	Changing jobs in sequential projects	4%	6%	10%	10%	70%
4.	Facing Non-cooperative issues with fellow Human resources	18%	20%	10%	12%	40%

5.	Having Managerial issues	10%	10%	2%	18%	60%
6.	Burden of Overload	4%	2%	4%	15%	75%
7.	Flexible working hours	35%	33%	20%	2%	10%
8.	Acquired ergonomic problems due to the nature of work	2%	3%	10%	13%	72%
9.	Acquired health-related problems due to work environment Pollution	2%	5%	08%	15%	70%

A fitness of good analysis made on the response scales obtained for item numbers 6 and 7 revealed a high level of similarity, both revealing the fact that their work influences their health. 85% of the respondents agree the fact that workers acquire ergonomic and other health-related problems due to the work nature or work environment they are put into. Only 5 to 6 % of the HR managers are responding positively that their workers are not overloaded or put under stress. And only 12% of HRs have accepted that flexible working hours are provided for workers. This shows that less percentage of HRs have revealed that their workers are enjoying flexible hours with not much workload (Ray and Regina Pana-Cryan, 2021). Similarly, % of HRs express the opinion that their workers do not suffer much health risk.

	<i>Satisfied with pay</i>	<i>Stick on to the job</i>	<i>Changing jobs</i>	<i>Having non-cooperative issues</i>	<i>Having Managerial issues</i>	<i>Burden of Overload</i>	<i>Flexible working hours</i>	<i>Acquired ergonomic problems</i>	<i>Health issues by environment Pollution</i>
Satisfied	1								
Stick on to	0.945	1							
Changing	-0.687	-0.523	1						
Having non-	-0.394	-0.274	0.905	1					
Having	-0.613	-0.513	0.965	0.924	1				
Burden of	-0.676	-0.537	0.990	0.896	0.986	1			

Flexible	0.805	0.827	-0.462	-0.126	-0.488	-0.523	1		
Acquired	-0.719	-0.561	0.997	0.878	0.966	0.994	-0.525	1	
Health issues	-0.724	-0.582	0.994	0.884	0.976	0.996	-0.539	0.998	1

A correlation study between the items helped to deduce some existing facts.

A pairwise correlation study was run for the above-obtained responses to check the correlation strengths between the items. With the worker job satisfaction and job switchover percentages as denoted by their specific HRs, a high level of negative correlation was obtained. This indicates that though the workers were given a flexible stress-free working environment, the monetary rewards they received were the highly influencing factor in deciding about quitting or retaining that job. There are some organizations that can provide comfortable and flexible work environments which greatly reduces the chances of health issues acquirement by the employees. However even such employees switch over to the job due to their non-satisfaction attitude purely based on the salary insufficiency and quit the present job for attraction of better salary elsewhere (Davidescu *et al.*, 2020).

People who have **multi-skilled talents only can** enjoy all the privileges in the organization, because organizations have the habit of recognizing or supporting, only those laborers who have multi-skilled skills. They may get the opportunity to access the decision-makers and get sanctioned for their obligations for personal or organizational needs. However as per the previous lead, only 15% of the construction industry employees are expected to be multi-skilled, and they stick to their jobs with good pay ($r=0.945$).

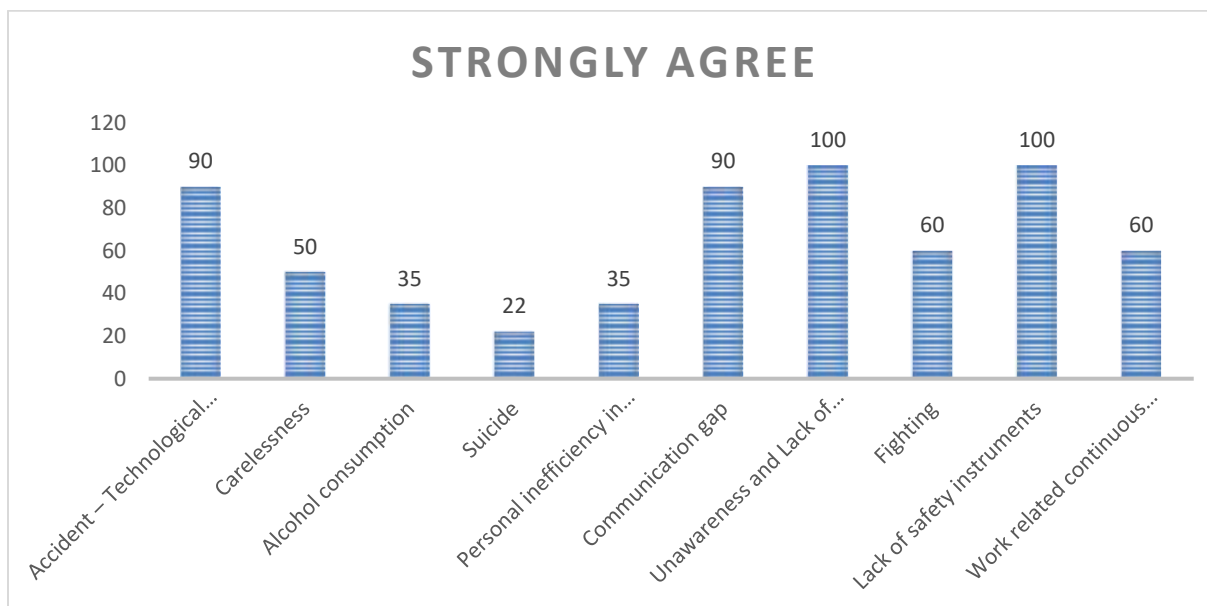
In an unsuitable work environment where the workers are highly burdened with work overload and continuously exposed to hazardous physical and chemical agents, health issues arise among workers and they also suffer ergonomically ($r=0.99$). These inconveniences often make their relationships with their managers, supervisors, and even co-workers very unfriendly ($r=0.97$) causing indifferent attitude development. Many times, this indifference of opinions among workers leads to internal strikes or job quitting ($r=0.99$). The low skill levels of workers may be due to biased and crude staffing processes.

3. Worker Safety: Health and life risks in the construction sector

The most valuable human life is something to be taken care of in a busy working environment. The number of worker/ employer deaths in construction industries recorded per year is

high. Also, the companies frequently face legal issues as they are put into trials when death and accidents of workers are encountered (da Silva and Amaral, 2019). The sector being unorganized is one of the main reasons. The main causes of worker/employer death as per questionnaire responses were analyzed.

As to the workers' life loss, the researcher would like to classify them as natural death or acquired death. Carelessness, alcohol consumption, suicide, fighting, personal inefficiency in handling the machine, etc when are the reasons, the deaths occurred and can be considered natural type. In the Acquired death type, the company holds itself responsible to some extent with further classifications of Chronic and Acute type. In the former, continuous exposure to certain work environments' hazardous physical or chemical agents may badly affect the physique of workers with ergonomic problems or functional collapse of body organs and systems. The latter is acute type death, wherein electrical shocks, machine severing, falls from heights, or exposures to acute lethal toxic chemicals used in construction industries or any such accidents leading to the immediate death of the victim become the reason.



The responses of subjects interviewed clearly explain the fact that more than the lack of worker's personal qualities like developing communication skills, self-control to avoid indulging in fights or avoiding alcohol consumption, to refrain from suicide attempts, lack of ability to understand any communication or instruction conveyed or personal carelessness, it is the lack of proper training

or awareness, and the lack of safety instruments that play a significant role (Cantley, 2014; Cantley, 2015)

Due to unavoidable job-related working nature, health collapses by **continuous exposure to hazardous physical or chemical agents** and the commitment to life-taking or killing nature of **technological errors are found to be the more risky reasons for the employee's death**. They are mostly **due to a lack of proper training or awareness programs as supported by the strength of response** percentage. The reasons listed in the latter half are considered very important in deciding the health risks of the work environment.

4a. Extent of Construction Delays:

	Never	Rare	Seldom	Frequent	Always
Response in %	3%	4%	14%	68%	11%

Most of them (68%) agreed that there are frequent project delays due to many reasons given below.

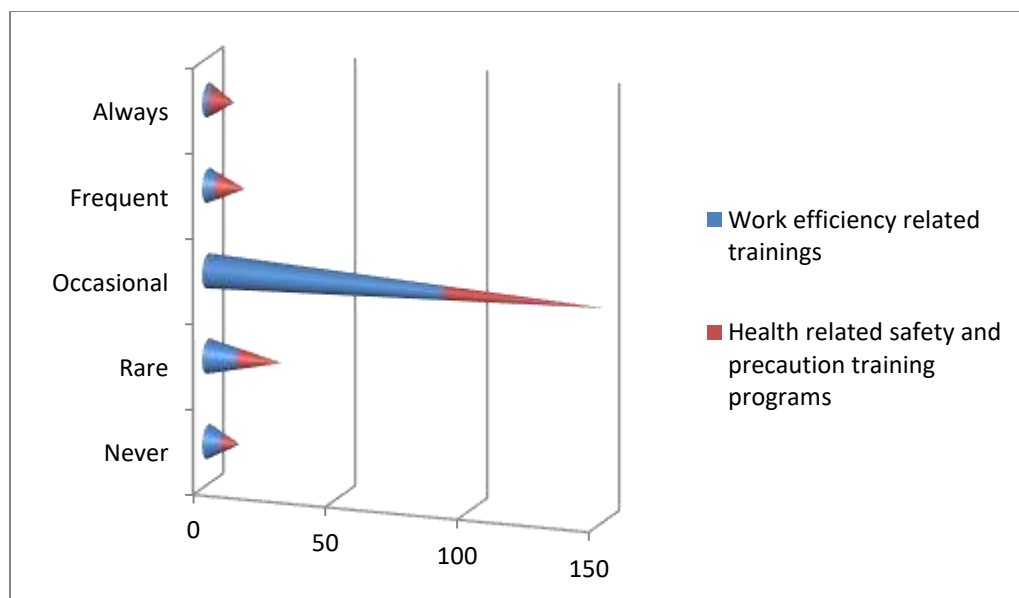
4b. Reasons for Project delays

Reasons	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Adopting Conventional Methods	-	-	-	80	20
Avoiding Modern Methods	-	-	-	80	20
Binding to find the lowest bidder	-	-	-	10	90
Changes in Government Policies	-	-	-	80	-
Changes in Project Schedule	-	-	-	80	-
Delay due to Human Resource Strike – Poor Policy	-	-	80	10	10
Delayed Approvals from Regulating Authorities	-	-	-	-	-
Delayed Decision-Making of Top-level Management	-	13	35	40	12
Delayed Material Delivery – Supply	-		20	70	10
Environmental Factors – Water /Air /Soil	-	15	10	45	30

Lack of Knowledge Sharing - Environment	-	50	-	50	-
Improper Planning – Poor Project Management	-	10	10	80	-
Labor Problems –strikes and indifference to opinion	-	20	10	55	25
Lack of Communication	-	5	-	10	85
Lack of Training	-	5	-	80	10
Lack of Financial Management	-	10	5	80	5
Lack of Supervision	-	20	-	-	-
Less no. of Knowledge Workers - Migration	10	-	-	-	90
Poor Adoption of Technology		20		80	
Poor Infrastructure to access the top management		30		70	10
Resisting Modern Methods – Technological Growth		50		50	
Traffic Restrictions – Night Works -		20		80	
Unskilled workforce – Demand for Skilled		5		5	90

From the responses received it is known that 68% of the tested subjects have reported about the existence of frequent project failures and construction delays. Obviously from the above results of the respondents, it is clear that **with the absence of job satisfaction and motivations or incentives for workers**, the frequent absenteeism and job quits occurring would be the reason for construction delays. **Moreover, in the absence of multi-skilled workers**, it becomes difficult to manage resource shortages which ultimately will lead to project failures. The second most influential factor is the language barrier to understanding the job instructions due to the increasing number of other state migrants speaking their native languages.

5. Training provided/organized in your organization



From the responses it can be inferred that construction organizations are not giving importance to workers' training according to their project-specific board, and they used to keep project-oriented training as a secondary one to enhance their working skills. Though it is mandatory in the construction sector to impart safety-related pieces of training, many organizations have neither provided nor measured the impact of the post-safety training with appropriate scaling.

The responses revealed a lack of overall orientation programs. The initial orientation programs will help the fresher a lot to know about the work environment and its nature. In spite of the mentorship and knowledge-sharing atmosphere available in construction companies, the responses report that the training gained by freshers is still not adequate.

6. How do you think that life loss can be rectified?

S.No.	Items	Strongly Disagree	Disagree	Neutral (Not sure)	Agree	Strongly Agree
1.	Recruiting healthy individuals	-	-	-	10	90
2.	Reducing the working hours and load	-	-	40	60	-
3.	Awareness programs – Periodical	-	-	-	10	90

	review – with best practice					
4.	Imparting Training (personal safety & machine handling) with feedback assessment	-	-	-	-	100
5.	Frequent health check-ups – with review	-	-	20	10	70
6.	Motivations and personal support related to attitude-building and healthy habits	-	-	20	80	-
7.	Technological advancements - enhancing the soft-skill training and assessing the eligibility to handle.	-	-	-	-	90

From the responses received it is found that among the tested reasons, the two reasons are considered to be very important in halting employer death in construction organizations. Ninety percent of the responses agreed to the fact, that there are lacunae in the recruitment process attaching less importance to screen the mental and physical health fitness of the workers. Similarly, ninety percent of the respondents also agreed to the fact that workers' life loss can be avoided to a greater extent by imparting knowledge, awareness, and training about technological improvements along with some periodical assessments. Also, 60 - 80% of respondents went with the facts that frequent motivations, health check-ups work time, and overload reductions can definitely save the life of human resources in construction sectors.

There are chances that due to frustrations developed by work overload, the mental and physical health of workers become unstable and then fall victim to committing errors to put their lives at risk. The condition may be still worse if they are already unhealthy and not in a position to receive any kind of motivation. All the strings under this tested item namely 'reasons for avoiding worker life loss' had significantly positive effects, which shows that considering all the examined points in this item is a must for the sustainability and development of construction organization. Attending to

laborers' health needs and caring for their safety can make a positive transformation of workers' attitudes toward employers, to make their role more reliable (Cameron and Hare, 2008).

Conclusions and Suggestions

The human resource availability and the scope for their enrolment are enormous in the present scenario. Without human resources, construction companies cannot exist. Even though the construction process is being modernized, computers and machines require human intervention to function appropriately. The responses support the fact that there is a lack of talented and multi-skilled workers in the present scenario in the construction industry.

The recognized problem is that, in the absence of multi-skilled laborers, the option or chance for low-skilled persons to get enrolled in construction projects remains high, however, that affects production and overall industrial growth suffers. Obviously, with modernization, the automation trend in the construction sector is increasing which may reduce the need for unskilled human resources in the future. In this context, technological skill improvement training will become more important.

Lack of Job satisfaction

Based on the results obtained for Section II - question 4 to test worker's job satisfaction in construction organizations a conclusion was derived that only for a few exceptions most of the workers are not satisfied with their work, either experiencing a sort of bully from superiors or disliking the environment and nature. There is frequent job quitting by workers faced by the construction companies.

Based on the results obtained for question 5 regarding the worker benefits, incentives, and motives received by the employees, the fact that was understood is that the majority of workers are denied and don't enjoy any reasonable job incentives or family welfare schemes raised from their companies. Also, there is a lack of career growth opportunities.

Being an unorganized sector, there are no fixed working hours, a fixed set of needed skills among workers, fixed eligibility criteria to be checked while recruitment or staff outsourcing by the company, etc. All these pose a great challenge for the construction company.

Health and Security risk prevention

The importance of the **communication gap** as a serious reason for accidental deaths in the work environment needs attention as per the response to item 6, which supports it for not having a

proper translator. All other major deaths caused due to reasons denoted in other items 1, 7, 9, 10 of 8b namely lack of awareness training, ignoring safety precautions or unavailability of safety instruments, and extensive exposures to unsafe agents have to be considered for avoidance by taking proper measures (Mohanad *et al.*, 2021).

Also, Compensation and benefits plans are especially important to construction workers whose livelihood depends on their health (Annadi, 1996).

Training needs

After finding the right professionals for the job, the HR department is responsible for ensuring they are properly trained. In addition to providing initial training during onboarding, human resources needs to identify and oversee ongoing training needs, including equipment skills, work techniques for specialized tasks, and certifications.

- Despite the mentorship and knowledge-sharing atmosphere available in organizations, the responses report that the training gained by freshers is still neither adequate nor up to the mark.
- Construction companies face many project delays and failures due to various reasons. Amongst the many reasons for project failures, the lack of efficient human resource support due to the employer's poorly planned inconsiderate approach and extensively exploitive utilization without any reasonable rewards brings in staff quitting which is the surmounting influencing factor. Motivational training for attitude shifting and transforming can be highly helpful.
- The conclusion is that much skill development or safety-oriented training is not imparted to human resources at construction organizations.

Need for Certification Courses and Government Regulations

Structured course framing and certification requirements for employment, Segmenting the construction phases and need for Government approval, Government regulations with fixed time schedules for each construction phase, Stringy norms to be upheld by construction people, Involvement of human resources in the decision-making process, By frequent internal assessments, Proper planning and scheduling, Efficient staffing by going for certified and skilled personnel etc., are very much important altogether to attain construction success (<https://abelinfra.com>).

Standard staffing procedure

Compulsory training skills and specific certification course demands as in any other organized sector when followed by construction industries can have a high influence on the success of a construction sector. A practice of standardized staffing procedure (Myrna Gusdorf, 2008), supported with frequent training cum assessments and paying considerable attention to workers' benefits and security will make a positive impact on the growth and success of construction industries. As a way of looking ahead and expecting good things, the way of transformation of the construction industry from an unorganized to an organized sector should be taken into account. A structured well-planned recruitment procedure can exist only in an organized sector.

Need for technological interventions.

Most important of all there must be technological interventions to smoothen human activities. The site operatives have to work in unacceptably cold, hot, or wet conditions with dangerous machinery and relatively unsanitary eating and toilet facilities. Since the researcher has not covered contract labor in the study, more focus has been on the safety and health hazards for project-based employees in the organization. Service-oriented office-based employees reported the problems of workplace hazards. Factors like long working hours leading to physical fatigue and stress, dusty environment leading to sickness, and breathing discomfort were reported as the major issues towards increased occupational health hazards.

Worker safety is a constant concern in the construction business and is one of the foremost duties and responsibilities of companies. Work may sometimes involve hazardous surroundings or using equipment capable of causing injury or death. Keeping everyone safe on the job goes hand in hand with proper training procedures that include an appropriate emphasis on safety. Protecting your workers is not only the right thing to do—it can also help prevent financial disaster (Abdalla *et al.*, 2017). Companies who neglect to take important safety precautions could be at risk for staggering expenses. Direct and indirect costs from workplace accidents may include:

- Medical expenses
- Rising workers' compensation insurance premiums
- Lost productivity as an injured worker recovers
- The cost of finding and training substitute workers
- The possibility of lawsuits from injured parties
- Damage to the construction firm's reputation

Emerging Technologies, Automation, and Robotics in Construction

Construction sites of the future will likely increase the use of advanced technologies such as drones, exoskeletons, autonomous vehicles, remotely controlled mobile equipment, 3-D printing, and building information modeling (BIM). These technologies are expected to increase productivity and quality while reducing the cost of construction projects. In addition, the new technologies can improve the safety of workers for certain tasks (Delgado *et al.*, 2019).

Protective Equipment

Exoskeletons have been used in reducing worker shoulder strain during overhead jobs. Wearable devices and sensor technologies also have been used to monitor workplace hazard exposures. Headsets can even actively reduce noise pollution while keeping workers in tune with their surroundings. Sensor technologies can be used as burglar alarms, gas sensors can be used to alarm danger at mine construction sites. Reliance on 3D printing continues to skyrocket, resulting in decreased transportation risks, and environmental sensors that detect noise, heat, and wind at construction sites provide warnings to evacuate construction workers and move costly construction equipment in the event of an emergency or natural disaster. The automation machines are capable of identifying common safety issues and eliminating those threats one at a time. Wearable innovations are making their way to the job site with work boots that connect to Wi-Fi and alert others if a person has fallen.

Personal safety and equipment loss continues to be the biggest liabilities in construction. Drones can perform jobs in place of human workers to prevent injury, such as jobs requiring scaling super tall structures. As on-site security tools, drones can be leveraged to reduce labor costs and minimize the risk of theft, keeping projects on schedule and minimizing hiccups (<https://www.robotics247.com/>). It is worth mentioning that automated construction and robotics enhance the work environment because workers will be distanced from uncomfortable work positions. Automations enable them to perform increasingly complex tasks, considered dangerous and unpleasant for people. Robots were used to weld, spray paint, move heavy objects, handle hot materials, etc. Workers can escape harsh workplace ambiance or exposure to dust. Calibrations in relation to environments are possible. The use of telebelts and telescopic booms can easily and quickly

clear obstacles, perform multiple tasks, and save time and labor requiring less manpower and handling machines.

Improving productivity, quality, and safety.

These construction industry trends are rapidly changing the global market — rising prices and skilled labor shortages are likely to continue in the coming decade, and regulatory challenges may become stricter with intense scrutiny on workplace safety and climate change adaptation. By adopting new safety practices, leveraging new technologies, and investing in new automation projects, builders and developers can reduce risk, win more contracts, and enjoy profitability. They can be economical to use. Work will be completed at a faster rate. Robotics will directly or indirectly save engineers, builders, and owners from facing legal hitches, productivity will increase, will have a balancing effect on wages, and will reduce occupational injuries.

One of the most noticeable construction trends of the past few years is a vast increase in the demand for labor. Quality labor is expensive and competitive, though robots do pick up a lot of the slack. Despite these robots' best efforts, we will need more educated workers to manage and interpret the data produced by new technology. With more employees operating outside of the construction site, providing appropriate training will be more important than ever before in helping companies reduce human errors and breaches. Training employees on best cybersecurity practices to keep things safe – to prepare small and midsize construction industries to use technology safely (National Cyber Security Centre, 2022).

For small and midsize construction businesses, a big driver of future competitiveness and success will be the widespread adoption of new digital tools and technologies that not only enhance customer experience but create new business opportunities. Hence, it is necessary for economic effort from the private industry and government to provide funds and resources for imparting need-based training and for the research and development of robot technology.

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