

The US labor Shortage in Construction Industry – An Overview

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Abstract: In recent years, the construction industry in the USA has experienced record gaps in the workforce. The labor gap cuts across multiple areas in construction industry, including civil engineers, mechanical engineers, electrical engineers, architects, surveyors, skilled trades, HVAC technicians, and plumbing. A company with a weak talent roster will struggle against more robust competitors. A lack of skilled construction workers means that staff on site simply lack the knowledge and experience to perform tasks in the most effective and efficient ways. This creates delays and cost overruns, with rework. Adding to the current situation, the future will likely bring even more pressure on construction output. More work under an unforgiving schedule means teams must move faster and potentially take shortcuts to minimize delays, which translates into a higher chance of safety issues and quality problems. Unfortunately, the trends suggest the shortage is unlikely to end any time soon. Considering the severity of the workforce shortage and the likelihood of it increasing, it is clearly important to many contractors to optimize the productivity of their current workers. This paper presents an overview of the USA labor shortage in construction industry and how to address it.

Keywords: Labor Shortage, Construction Industry, Key Performance Indicators, Offsite Construction.

1. INTRODUCTION

Skilled labor shortage in construction refer to a situation where there is a lack of construction workers and professionals in the industry. The construction industry must recruit hundreds of thousands of qualified skilled construction professionals each year to build the places where we live, work, play, worship, learn and heal. In the US, the construction industry labor shortage is quite serious, and some areas of the country have labeled the shortage of workers in residential construction as a crisis. In 2021, the Associated Builders and Contractors Organization noted that an additional 430,000 jobs needed to be filled on top of the normal hiring pace to meet construction labor demands. In 2022 that number was raised to 650,000. In this year 2023, it was estimated that the construction industry might need to attract about 546,000 additional workers. In 2024, the industry will need to bring in more than 342,000 new workers, and that is presuming that construction spending growth slows significantly as well [1]. Concurrently, according to the National Center for Construction Education and Research, approximately 41 percent of the current construction workforce will retire by 2031 [2]. The basic types of labor shortage include:

Quantity of people: There can be a labor shortage when there are not enough qualified applicants to fill an organization's needs.

Quality of job candidates: When an employer has difficulty finding employees with the qualifications they need, there also can be a labor shortage.

Impact of Labor Shortage on Business Owners

For the owners, the labor shortage can lead to project delays, increased costs, safety concerns, compromised workmanship, and other related challenges, which can directly affect a client's experience. Owners might struggle to find qualified contractors. This, in turn, may damage the reputation of construction firms and impact their ability to secure future projects.

Labor shortages also affect the widespread supply chain disruptions that have made it difficult for construction firms to get materials delivered on time and that are driving up the cost of those materials. Supply chain problems and labor shortages are making construction more expensive. Cost and supply chain challenges have prompted some owners to cancel or delay projects due to increasing costs, or due to lengthening or uncertain completion times. Most firms struggle to find qualified candidates. The limited availability of skilled workers can extend construction schedules, leading to potential financial penalties, strained client relationships and disruptions to project planning. Labor shortages can drive up wages and salaries, squeezing profit margins and potentially leading to higher construction costs for clients. Labor shortages have caused lack of skilled job applicants. Most construction firms currently have difficulty finding qualified candidates to work in the industry for lack of skills. Although the construction industry today employs about 7.7 million people in the US. However, according to a report by the Associated General Contractors of America, 89% of construction firms faced challenges in hiring skilled workers in 2023 [3].

Impact of Labor Shortage on Contractors and Builders

For contractors and builders, the labor shortage can lead to many challenges and risks. Projects can take longer and cost more. Quality control and productivity may suffer, which can lead to an increase in construction defects and losses. Labor shortages can strain the existing workforce, impacting workplace safety. Having fewer construction workers means projects are taking longer. A project that a full team could complete in days might take weeks for a skeleton crew and construction jobs can last months or even years, depending on the work involved. With fewer workers comes higher pressure, which could lead to missed quality checks and lower performance. Trying to do projects without a whole crew might cause trouble because staff members normally double-check each other's work. Additionally, workers may feel rushed to complete a job because they have so many clients demanding their attention. A lack of quality control can lead to dangerous working conditions because people can overexert themselves and get injured in the process. Overlooked safety checks can also lead to accidents. Furthermore, because construction projects rely on a chain of companies spanning engineering, materials fabrication, distribution, and freight, any shortage of materials or labor at any point along the chain may cause delays, drive up costs, and result in projects being scaled back or scrapped that could have far-reaching economic ramifications. Some contractors are forced to hire lesser-skilled workers in order to meet the demand, a risky endeavor since adhering to safety regulations is of utmost importance in the construction industry. Even non-life-threatening mistakes on a job site are cause for great concern as they can cost a firm thousands of dollars. Due to the diminishing focus on the trades in educational institutions, it is likely that the few younger employees that companies can hire will fall into the category of lesser-skilled workers. Another impact of the skills gap is that in some cases, commercial contractors are moving into residential construction, which can create problems. Commercial and residential are two very different types of construction with a different subcontractor base and skill set. For these and other reasons, the economic pressure to meet the urgent demand for housing during this labor shortage has increased the safety risks for many construction workers. According to a 2022 survey by the Associated General Contractors of America, a vast majority (91%) of construction firms with open positions report having difficulty finding professionals to fill craft and salaried positions. A majority (77%) of firms say the difficulty is due to a lack of qualified candidates. The labor shortfall has caused contractors to hold on to workers they otherwise would not [3].

Impact of Labor Shortage on Design Firms

For design firms, labor shortage makes it difficult to them to hire and retain the skilled workers they need for all the infrastructure work that is currently available. Some firms have to make difficult decisions about what work they can and cannot do. This is especially true following the recent influx of hundreds of billions of dollars in federal funding over the next several years from the Infrastructure Investment and Jobs Act and the Inflation Reduction Act. The labor shortage can result in a scarcity of experienced designers. This would negatively affect the quality of work, and the reputation of the business. With a smaller labor force, designers often face increased workloads. The existing workforce may need to take on additional tasks and responsibilities, potentially leading to fatigue, burnout, increased overtime, and reduced productivity. This can further compound project delays and impact the overall quality of work.

2. CAUSES OF THE LABOR SHORTAGE IN THE USA

There are several contributing factors to the skilled labor shortages in the US construction industry [4] [5] [6] [7] [8]:

1. Impact of COVID-19 pandemic

Since 2020, the COVID-19 pandemic has presented significant roadblocks for the construction industry and its workers. At the start of the pandemic, most industries experienced a sharp increase in the number of unemployed persons per job opening, as industries laid off workers and tried to reduce expenses. As the pandemic progressed, this ratio quickly inverted,

with growing job opening rates. This could have been explained by a mix of public safety concerns and government funding making it not immediately necessary for unemployed persons to reenter the workforce. Moreover, the COVID-19 pandemic has led to a reduction in the number of immigrants coming to the United States, many of whom have traditionally filled construction jobs. While vaccines have helped to mitigate some of the health risks brought on by the pandemic, labor disruptions still impact the industry.

2. Economic conditions and Recession

Even prior to the start of the pandemic in 2020, the construction industry experienced shortages with the labor force since the 1970s. Particularly, the Great Recession of 2008 led to a significant reduction in the number of workers in the industry, as many lost their jobs and found employment in other sectors. As the industry gradually recovered from the recession that followed, many construction companies experienced a shortage of workers with available skill sets to meet market demands. In response to layoffs between 2008-2011, scores of construction workers pursued opportunities in other sectors. Some of these opportunities led to permanent employment, which further deterred construction workers from returning to the industry.

3. Aging Workforce

Many construction workers and professionals are approaching retirement age and permanently leaving the construction workforce. With fewer new workers entering the field to fill these open positions, there is a gap in the supply of workers and professionals compared to the demand for work. According to the U.S. Bureau of Labor Statistics, the average age for construction workers is 42.5 years old [9], and due to the fact that many experienced workers take their knowledge and experience with them when they retire, this will likely become more impactful in the coming years. Furthermore, because of the lack of knowledge in circulation among younger construction workers, the emerging workforce stands to make more mistakes. As a result, productivity will decrease along with the quality of new projects.

4. Lack of Interest in Construction Jobs

The younger generation of workers tends to view construction work as dangerous, low-paying, and physically demanding. In fact, research suggests 48% of surveyed 18 to 25 year-olds want less physically demanding jobs, citing opportunities with less physical demand and greater flexibility as a reason to look elsewhere for employment. This combination of details can make construction seem less appealing than it was for previous generations. The new generation employees tend to set higher expectations for themselves regarding finding work that fits their needs and future plans. Younger workers value positions that offer livable wages, perks, flexible schedules, and emphasize safety. They are less willing than past generations to sacrifice their physical and mental well-being for the sake of their careers. As such, the interest in construction work has waned somewhat in recent years. However, innovative construction technology like robotic layout is helping make construction work safer and more attractive to new workers and seasoned workers alike. The construction industry quit rate, or the share of construction workers who quit their jobs averaged 2.5% during the first 5 months of 2023. Over the previous decade, the construction industry's quit rate averaged just 1.8% [10]. In recent times, more industries are emerging as competing employers for workforce. In 2022, for example, Amazon made waves in the job market after committing a \$1 billion investment in training and wage access programs, along with increasing hourly wages. These kinds of incentives drew away workers from the construction industry, even though their skills may not have been transferrable [10].

5. High Demand for Jobs that Offer Flexibility

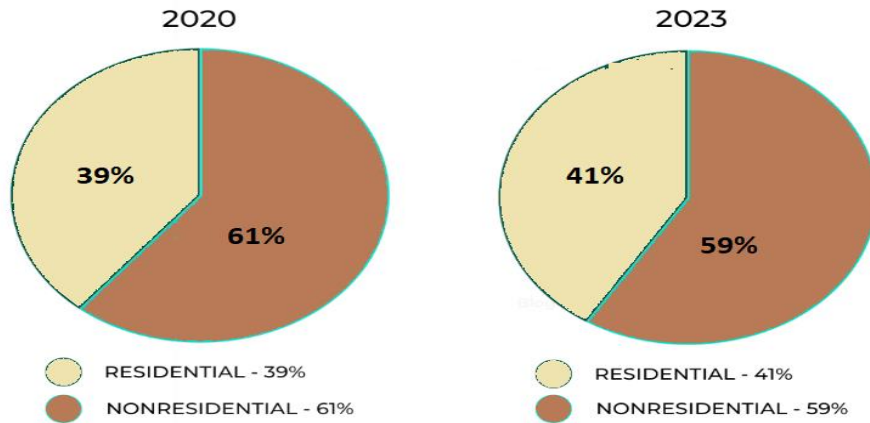
Positions in construction are jobs that usually tend to be done in person. This may not appeal to people who have experienced the benefits of working remotely during the pandemic and want to apply to jobs that offer this flexibility whether that be fully remote or hybrid options. According to a survey of 10,000 knowledge workers from Future Forum, workers want flexibility in both location and schedule [11].

3. DATA AND STATISTICS ON THE LABOR SHORTAGE IN THE USA

1. Sector View of Construction Labor Shortage

Labor shortage of residential construction accounted for 39.0% of all construction workers at the start of the pandemic in 2020. As of January 2023, that share had risen to 41% as shown in the chart below [12].

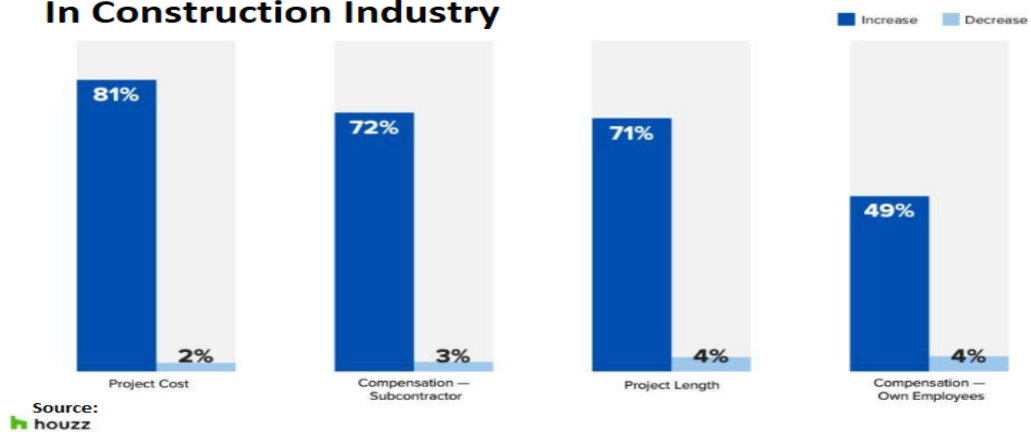
SECTOR VIEW OF CONSTRUCTION LABOR SHORTAGE IN 2020 AND 2023



2. The Overall Impact of Labor Shortage on Construction Industry

On average, the labor shortage has increased project costs by 81%, project lengths by 71%, compensation for subcontractors by 72%, and compensation for employees by 49% as shown in the graph below [13].

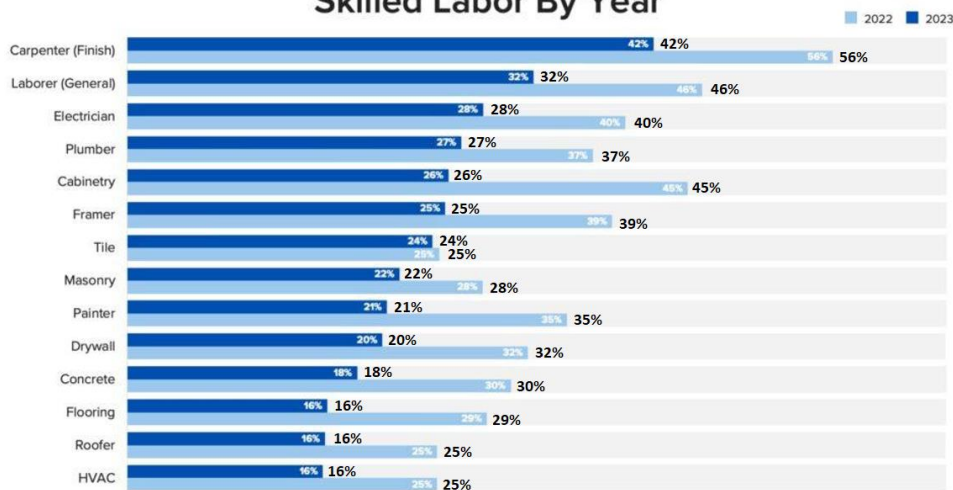
Frequency of Changes due to Skilled Labor Shortages In Construction Industry



3. Labor Shortage in Construction by Craft

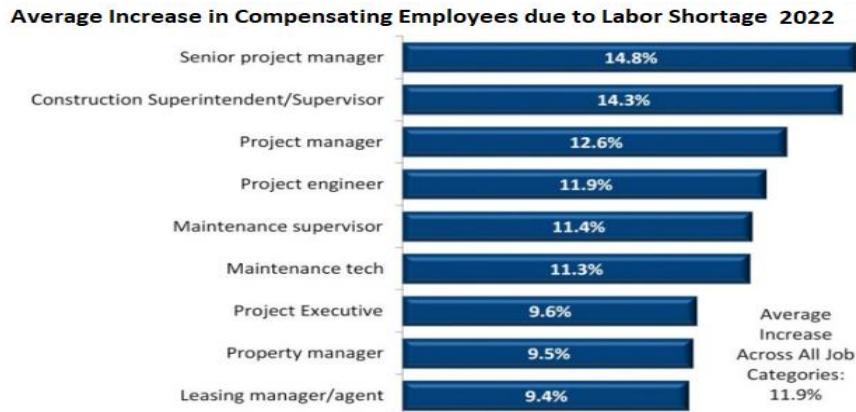
On average, labor shortages in 2023 for carpenters is 42%, electrician 28%, plumbers 27%, framers 25%, masonry 22%, painters 21%, concrete finishers 18%, roofers 16%, and HVAC 16% as shown in the graph below [13].

Frequency of Moderate to Severe Shortages Among Skilled Labor By Year



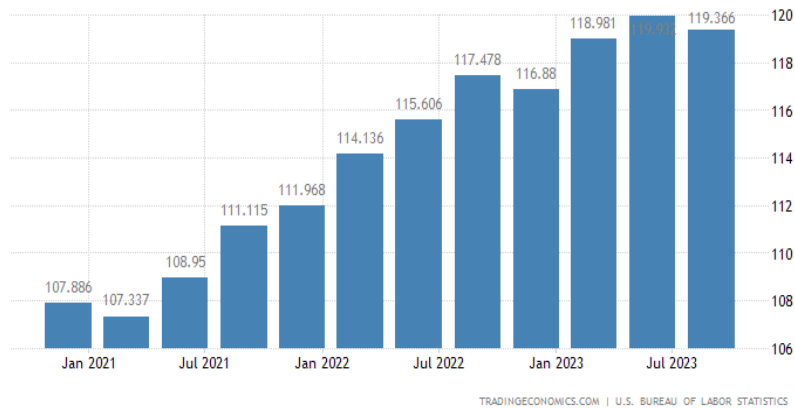
4. Compensation of Employees in Construction due to Labor Shortage

The average increase in compensation of employees across all professional jobs is 11.9% as shown in the graph below [13].



5. Labor Cost in Construction

Labor Costs in the United States increased to 119.37 points in the third quarter of 2023 from 118.98 points in the second quarter of 2023, as shown in the graph below. Labor Costs in the United States averaged 59.54 points from 1950 until 2023, reaching an all-time high of 119.93 points in the second quarter of 2023 and a record low of 15.92 points in the first quarter of 1950 [14].

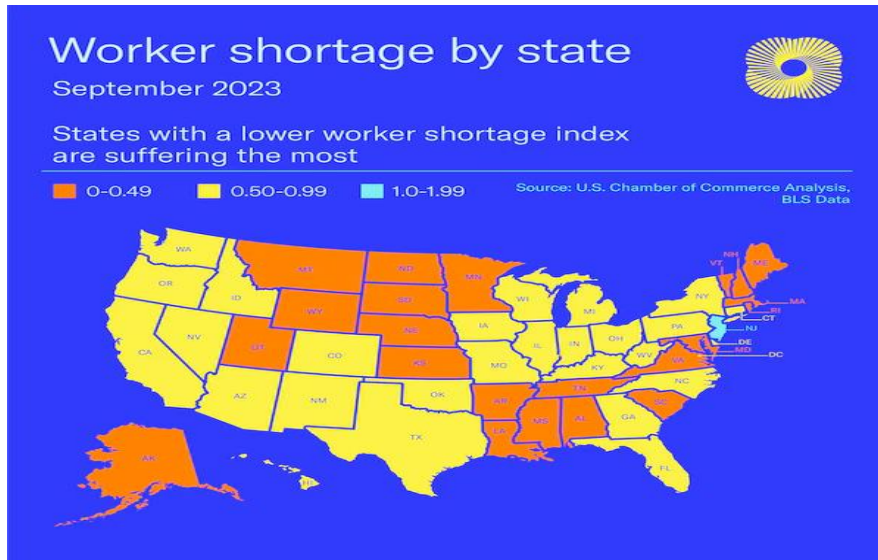


6. Labor Force Participation Rate in the US

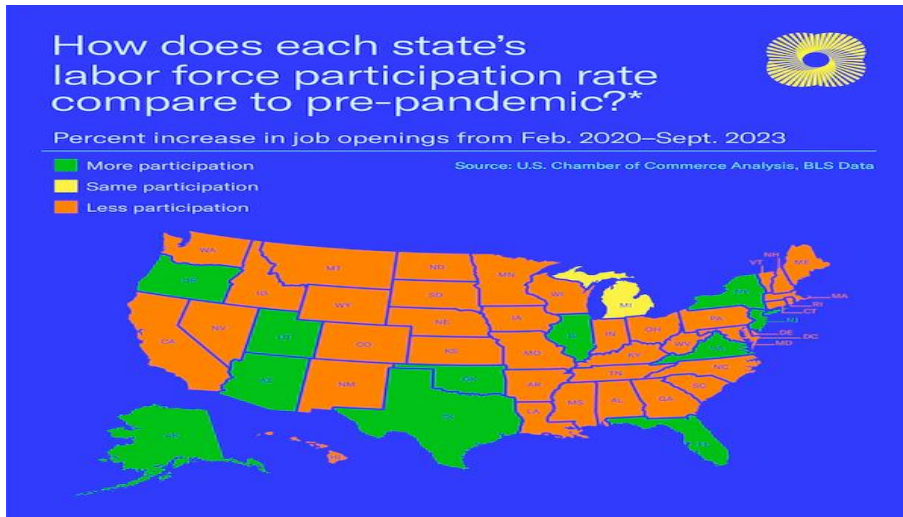
Right now, the labor force participation rate is 62.7%, down from 63.3% in February 2020 and 67.2% in January 2001 as shown in the Figure below [15].



7. Labor Shortage in the US by State is shown in the Figure below [15]



8. Labor Force Participation Rate by State Compared to Pre-Pandemic Rate is shown in the Figure below [15]



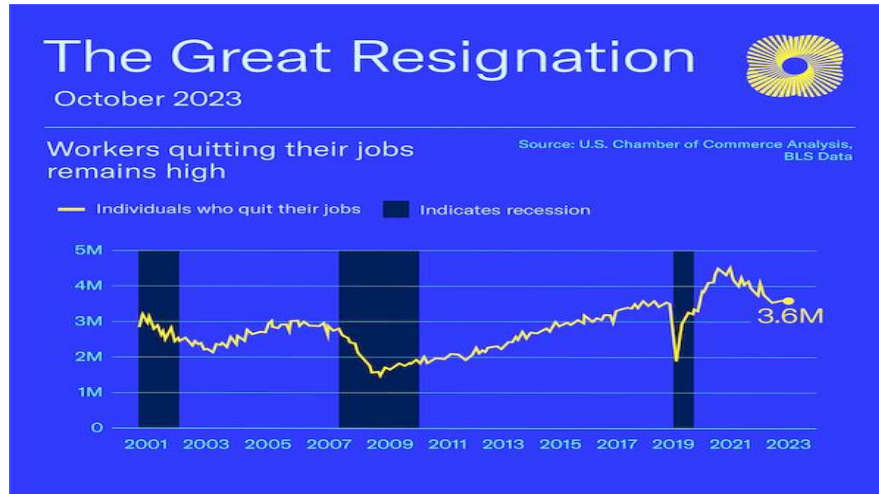
9. Job Openings vs Unemployed Workers in the US

Currently, there are 9.5M open jobs in the U.S., however, there are 6.5M unemployed workers in the U.S. If every unemployed person in the country found a job, we would still have 3 million open jobs, as shown in the Figure below [15].

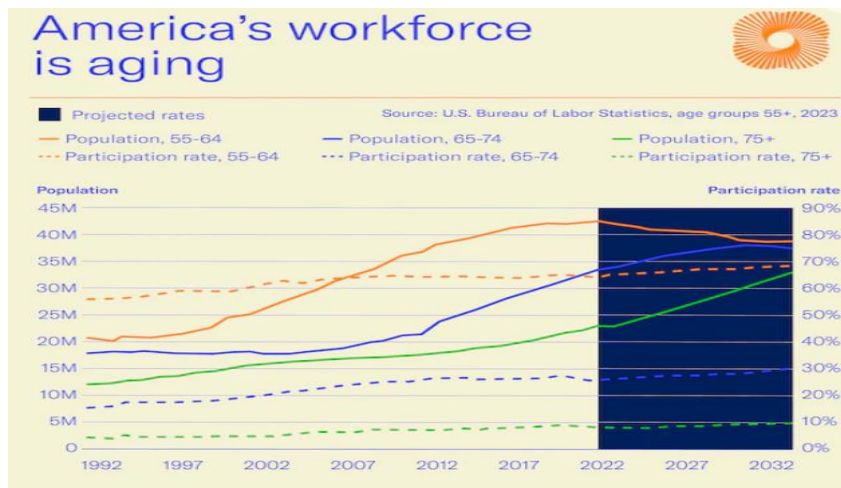


10. Workers Quitting Their Jobs

More than 34 million Americans quit their jobs in 2023 and 3.7 million quit in September alone. However, the hiring rate has outpaced the quit rate since November 2020, as shown in the Figure below [15]. This means Americans are seeking – and finding – better opportunities with new employers and in new occupations and industries.

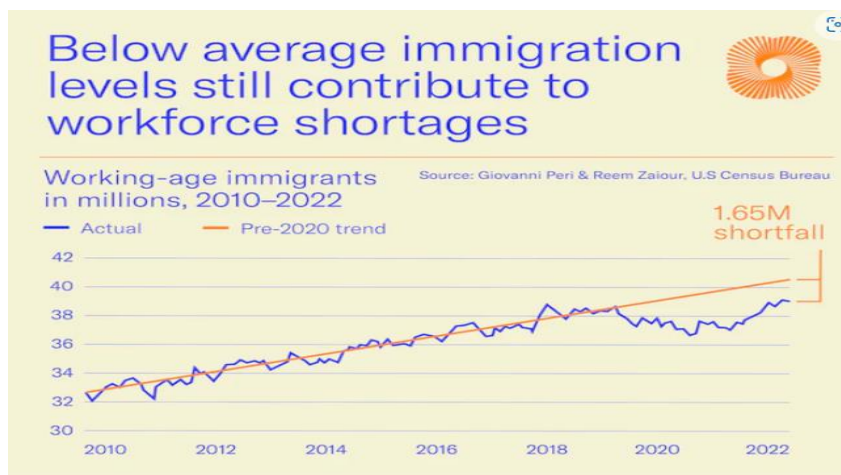


11. The Aging Workforce in the US is shown in the Figure below [9]

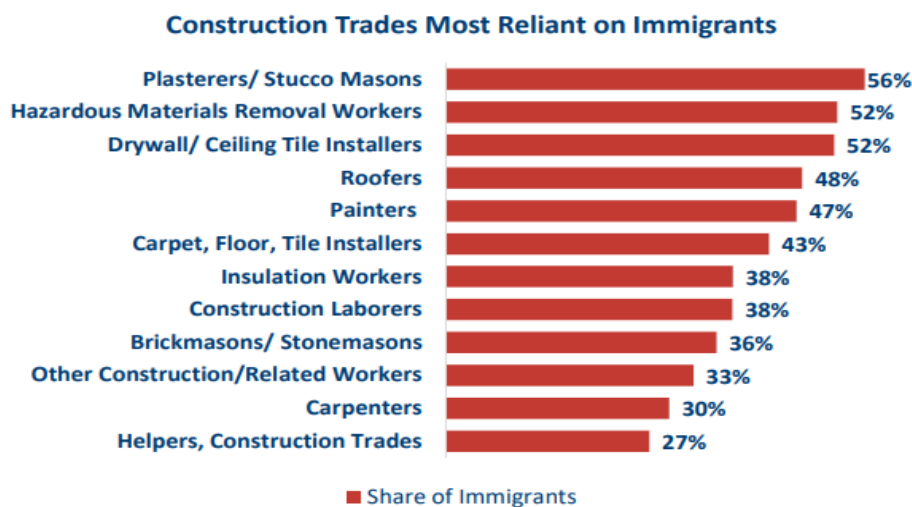


12. Labor Shortage due to Immigration Decline

There was 1.65 M shortfall in immigration in 2022 that was contributed to workforce in the US as shown in the Figure below [16].



13. Construction Trades most Reliant on Immigrants are shown in the graph below [17]



4. ADDRESSING THE US CONSTRUCTION LABOR SHORTAGE

To address the US skilled labor shortage in construction, a multi-faceted approach can be implemented by the following steps:

1. Raise the Pay Scale

Providing more competitive wages can help my organization retain existing workers and attract new employees within their respective industries. Start by reassessing your budgets to see if you can revise wage and benefit offerings. When a potential candidate is offered a higher hourly wage, they might be less inclined to consider a job with our competitor. If you cannot raise employee wages, then you may want to consider raising your prices in order to support a necessary wage increase.

2. Provide Competitive Benefits

Health insurance only covers the basics of today's workplace benefits, so you need to expand upon what we have to offer if you want to keep workers satisfied. I would suggest offering the following benefits in an effort to stand out among competitors in the industry: greater family leave policies; greater maternity benefits; Child Care Assistance; mental health services; college savings programs; retirement planning; and health club memberships. In addition, I would suggest offering additional employment benefits. These benefits may include additional paid time off and well-being stipends. This can assist my organization in maintaining an ample workforce.

3. Reward Existing Employees

You can also use rewards and incentives to help retain current workers. These incentives may include monthly bonuses for top performers or extra discounts on business merchandise (if applicable).

4. Make the Job Application Process Easy

I would suggest lowering the barrier to entry and make it easy for candidates to find and apply for jobs in my organization. This means providing clear information on the job, duties, and pay so they can easily see what is on offer.

5. Find new candidate pools by creating internships or apprenticeships that are attractive to a different set of potential employees.

6. Offer Flexible Scheduling and Work Environment

Wages alone are not enough, because there is a quality of life issue on the table. Workers re-entering the workforce after pandemic have gotten a taste of work-life balance, and they are not going to give it up. They want more flexibility from their work, and one of the best ways to do that is offering flexible scheduling. Using a shift scheduling tool is a good way to make that happen, for example, letting workers request shifts that fit their schedule and swap shifts with each other. By making shifts flexible and giving some control to our employees, we let employees have control over their life while we get the shift coverage we need.

7. Introduce Employee Referral Program

You could introduce an employee referral program to fill a critical job opening. With an employee referral program, we can tap into our team's networks to identify a skilled candidate that is also a good cultural fit. In this fashion, the recruiting process is shortened, thereby reducing the cost of supporting a hire. Referral hires also tend to have greater job satisfaction and subsequently, to stay with a company longer. Referral programs can even involve company stakeholders, retirees, and families of our current employees. Once we have successfully found a candidate that is culturally and functionally qualified and is officially hired, offer the employee who facilitated the referral a cash incentive or referral bonus.

8. Embrace Flexibility and Remote Work

Since employment trends and employee behavior have been altered by the COVID-19 pandemic, most employees now prefer flexibility generally. Therefore, consider offering the flexibility of working remotely or, if that is not possible, of developing a hybrid working model. I would conduct a survey to determine what flexibility our employees desire and accommodate them accordingly, within reason. This will help boost retention. The entire concept of work is changing, and rather than pushing back, construction companies need to lean into change if they want to attract today's workforce.

9. Limit Business Hours

To ensure existing employees feel properly supported in their roles, we may need to adjust their business hours. Doing so can prevent employees from being overworked amid understaffed shifts.

10. Ensure Effective Onboarding Processes

Onboarding can significantly improve employee engagement and reduce turnover within our organization. And taking employees through the standard orientation process does not cut it. Especially, if labor shortages require employers to hire inexperienced workers, it is critical to have proper onboarding protocols in place. These protocols can equip new employees with the knowledge and resources they need to succeed in their roles.

11. Provide Education and Training

Employee education and training are beneficial to both organizations and employees. It would improve company culture, increase productivity, support workplace safety, and boost individual and organizational performance. This can supplement the implementation of technology in construction. In addition to having machinery handle the more dangerous and labor-intensive elements of a project, training and educating construction workers aims to not only further reduce injury risks but improve efficiency and productivity as well. Furthermore, providing employees with opportunities to learn and grow with the company motivates them to enhance their skills while remaining with the business. Much of the efforts to reduce employee turnover rates involve keeping construction workers engaged and constantly improving their skills. We should have all of workers engage in regular, and job-specific safety training.

12. Schedule Regular Check-Ins

It is vital for us to check in with our workers on a frequent basis. Keeping such consistent communication will motivate employees to share any safety concerns or other work-related issues that arise, allowing us to remedy these problems before they cause liability incidents.

13. Improve Work-Life Balance

An exhausted, frustrated construction worker is rarely a safe and efficient member of the team. To prevent burnout and attract new workers, improving work-life balance in construction careers is a must. Young people do not enjoy the idea of working long, exhausting hours paired with very little time to recover from the workweek, so making changes to this previous norm presents hiring managers with an opportunity. We can be attractive to young workers when we demonstrate that we value a good work-life balance. I would plan to demonstrate that our firm has an upbuilding company culture. Assign workers to job sites near to their homes and communicate this to candidates.

14. Invest in New Technology

We are competing for intellectual capital with Apple, Google, Amazon, and the like. Embracing new construction technology is a business imperative. It can advance our work efficiency in the field and keep us relevant. It can make construction a more attractive career for younger generations and more satisfying for the more experienced worker, too. Robotics can help workers work more safely and more productively. Advances in automation, prefabrication, and modular

building can help protect workers by actually removing them from the hazards of construction where it is feasible to have a machine perform portions of work. Do more with less. Building information modeling and lean construction processes can help better organize, schedule, and forecast issues before they become problems that turn into fast-track work, which is inherently riskier. Technology brings better productivity and safety, with the added bonus of attracting and empowering the younger generations and even learning from them. Innovative technology serves to take a great deal of the risks and associated dangers out of the construction industry. While in the past, many labor-intensive processes traditionally placed human workers at greater risk of sustaining injuries, modern construction technology seeks to move away from these practices. Modern construction technologies can handle many of the potentially risky processes human workers had to contend with in past generations. Now that machinery has assumed more risks than human workers, construction as an industry is viewed as a safer and more attractive field.

15. Improve Accessibility

By providing accessibility options for construction workers who are dealing with injuries or other health conditions, retaining a company's workforce becomes more manageable. A pathway from fieldwork to office work for injured or ill construction workers enables them to keep working, continue making a decent wage, and remain dedicated to the field of construction. For example, one career path for injured workers involves becoming BIM detailers. Because they already have the expertise and field knowledge needed to thrive in this position, they can train to handle the software side of work during their recovery. Even when safety becomes a primary focus in construction, strain, and injuries do occur. In the past, construction workers who became injured on the job were unable to work in the field but did not have accessibility options to consider during recovery. As such, many were forced to seek alternative employment and abandon construction work altogether.

16. Offer Opportunities for Career Growth and Advancement

Providing opportunities for career growth is essential. Young people are frequently looking for ways to advance in their careers and expand upon their current skill sets. Construction companies that express interest in the futures of their employees tend to see lower turnover rates. This is because when a company invests in the betterment of its staff, each member of the team develops a stronger sense of loyalty to the business. Helping construction workers advance in their careers compels them to remain employed with companies that make growth and advancement accessible.

17. Foster Diversity and a Positive Work Culture

We have to develop diversity and inclusion programs in an effort to be more welcoming and inclusive to diverse groups of people. Workers want to feel like they belong at work just as much as they belong in their personal environments. Yet, the common stereotype associated with construction work, and construction workers in general, points toward a gruff and sometimes hostile work culture. For our company to attract workers from the younger generation, fostering a positive work culture is well worth the effort required. We need to increase workplace collaboration efforts, improve communication tactics, and create a transparent environment. Providing new employees from diverse backgrounds with the resources and support they need to become valuable and successful members of the workforce can mitigate many of the concerns that otherwise cause aspiring construction workers to hesitate.

18. Mentorship, Sponsorship, and Apprenticeship

These programs contribute to employee retention by preventing people from feeling their potential is being squandered. They broaden the perspectives of everyone involved while bolstering engagement, confidence, well-being, skill development, networking and belonging. Furthermore, they can help people of different backgrounds connect and cultivate strong relationships, building a more inclusive atmosphere. These programs provide personal and professional enrichment at all levels. Newer workers benefit from the vast experience of the more senior workers, and the more experienced workers can expand and possibly extend their careers by shifting away from the more physically demanding roles. Maintaining an intellectually stimulating environment is one of the cornerstones of talent retention. We can adopt "earn as you learn" incentives that help pay for these programs while maintaining the worker's value to the company.

19. Partnership with Trades

Diligence in vetting and cultivating strong relationships with trade contractors will pay dividends on your projects. Work is plentiful; however, trade contractors might be more likely to perform well if you take a vested interest in them as valued business partners. The benefits of partnership might include: sharing the workload and responsibilities; utilizing the trades experience and skills; and pursuing more business opportunities. However, there are challenges and drawbacks to consider, such as: encountering disagreements; making joint decisions; sharing the profit; and loss of autonomy.

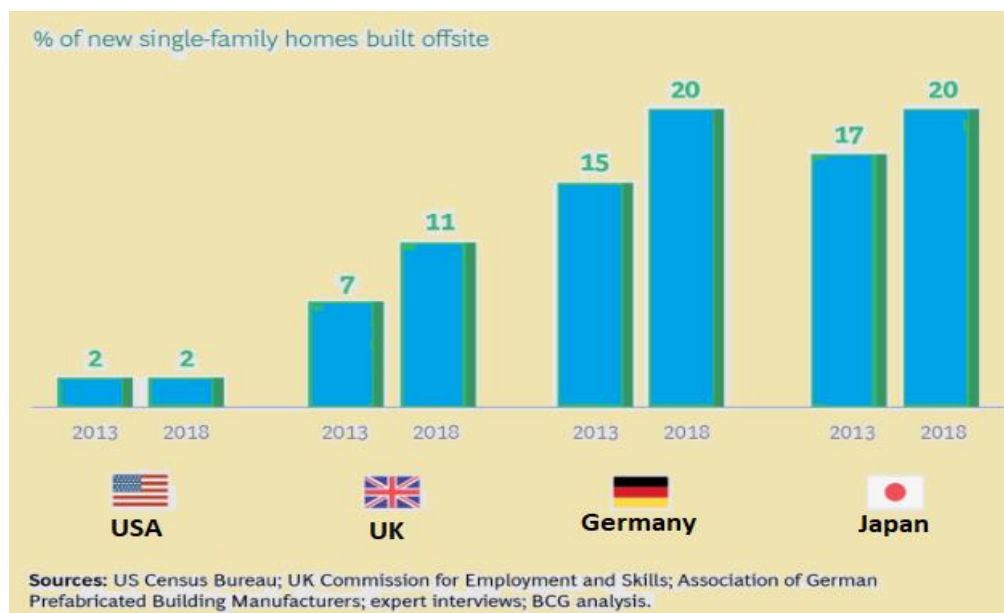
20. Two-way Communication

Two-way communication, early and often, with parties upstream and down, will enhance your ability to manage your projects in uncertain labor conditions. Consider adding project management staff to oversee and support quality, safety, and other job site activities, especially where new workers or subcontractors are involved. Watch for warning signs, especially in riskier scenarios such as the end of the day. Address schedule, manpower, escalation, and contingency concerns up front in the prime contract with the owner in consideration of a current "hot market" climate.

21. Offsite Construction

Off-site construction refers to modularization and off-site assembly as well as pre-fabrication prior to installation on-site. Offsite construction, or “prefabrication,” creates in a factory various parts of a building before assembling them on the building’s actual site. The parts can be either precast (concrete) or made from compound materials (such as sandwich panels). The offsite factory of today may produce flat-pack components (such as walls or beams), volumetric modules (bathroom pods or bedrooms), or even entire buildings. Offsite construction is another effective way to optimize a limited labor pool. Off-site construction involves the design, fabrication, transportation of fabricated building items and its assembling on the site with great speed and a high degree of finish. Offsite construction is not just safer and less wasteful of materials, but it can actually benefit both quality and scheduling. Therefore, the trend of investing in offsite construction should be taken seriously.

The practice of systematically constructing houses offsite goes back to the 20th century: builders in the US began selling “kit homes” in the early 1900s, for example. Offsite construction can alleviate some problems associated with traditional onsite methods, such as shorter building time and lower risk, higher quality, and reduced environmental impacts. Despite its long history and its compelling value proposition, offsite construction is only now gaining little traction as shown in the graph below.



The reasons for the slow uptake in offsite construction vary from market to market. In the past, to keep costs down, offsite-construction companies adhered to a policy of standardization. This approach tended to conflict with building-site constraints and with the individual owner’s preference for some degree of customization. Traditional construction is widely subject to tight labor rules regulating who can do what onsite, for instance, or specifying the minimum number of workers for a particular task. Such rules contravene the offsite labor model, which is based on small teams of broadly trained workers. Other rules, including health and safety regulations, planning codes, and mortgage or insurance requirements, have similarly hampered the development of offsite construction. The offsite rules are often local, and thus difficult to change, so no easy scaling of solutions has been possible. In addition, the construction sector is historically risk-averse. Construction is expensive when done right and potentially ruinous when done wrong. On the supply side, construction is a project-based and cyclical business, with constant cost pressures and low margins, and hence an aversion to heavy capital expenditure. These barriers had the effect of forcing offsite construction into a narrow cycle and limited use [18] [19] [20] [21].

5. METRICS AND KEY PERFORMANCE INDICATORS

The following metrics and key performance indicators can be used to assess the effectiveness of the solution [22] [23] [24] [25]. This can take several months to one year to see measurable results.

1. Unit Labor Cost

Unit Labor Cost (ULC) is how much a business pays its workers to produce one unit of output. Unit labor cost can be calculated as the ratio of: Total labor expense for a period / Total number of units produced in that period. Fixed labor costs are costs that are unlikely to change for a known period. For example, a fixed labor cost for a company would be the annual salary of an essential worker in a given year. While this employee could get a pay increase, employers have a good idea of the term of the salary relative to when increases are likely to occur. Variable labor costs are costs that increase and decrease with time. One example of a common variable labor cost is the rate of an hourly employee.

2. Collect and Establish Data on Labor

This can be the foundation for any active measurement of labor productivity. High-performing operations take this data system as a starting point to launch other measurement steps.

3. Schedule Performance

Tracks % of projects completed on or ahead of schedule. Meeting deadlines and milestones is critical for avoiding penalties, keeping stakeholders happy, and maximizing profitability.

4. Cost Performance

Measures % of projects completed within the original budget. Controlling costs is a key focus in construction's tight margins. This helps identify expense overruns to address.

5. Labor Productivity

Measures workforce efficiency with metrics like work hours per unit installed or performed. Optimal staffing and productivity controls labor cost overruns.

6. Equipment and Asset Utilization

Tracks % of available time equipment is actively used on revenue-generating tasks. Proper asset allocation optimizes profits.

7. Overhead Costs

Compares overhead spending like HR, admin, facilities, marketing against budgets. Controlling indirect costs helps maintain profitability.

8. Profit Margin

This measures profitability as a % of total revenue. Requires tracking project budget vs. actuals and driving higher margins.

9. Time-to-hire

In the construction, Time-to-hire is a recruiting metric that refers to the length of time between someone applying for a job and accepting a job offer. Assembling a team of qualified staff members, validating their construction qualifications, onboarding them and confirming their employment status can be a complicated process. Refining these procedures and reducing our time-to-hire is useful for maintaining efficiency in our construction practices.

10. Downtime Percentage

This measures the amount of time when factors like weather, equipment malfunctions or material shortages disrupt or delay work. Monitoring and analyzing downtime percentages enable proactive planning, risk mitigation and resource optimization. By tracking and addressing downtime, construction leaders enhance project efficiency, reduce costs, ensure timely completion, and increase client satisfaction.

11. Supplier Defect Rate

When we receive shipments from vendors, conduct inspections and determine the defect rate among raw materials, equipment, tools, and other supplies. Tracking this information tells us about the reliability and consistency of your construction suppliers. This metric can help us make choices about where we purchase our materials.

12. Rework Costs

This measure can be used when we correct or redo work that we have already completed. It can be necessary when someone makes a mistake, installs something incorrectly or does not follow construction plans. By tracking rework costs, we can better understand how much of the project's total costs the team may avoid with better planning, training, and attention to detail.

13. Income per Labor Hour

This measure combines profitability and efficiency into a single indicator that reviews how much revenue construction experts generate per average hour they work. Calculate this at the end of a project by dividing the total profit by the total number of labor hours the team contributed.

14. Client Satisfaction Score

Gathering data about client satisfaction is very useful. Administer surveys to clients with questions about their overall satisfaction to develop a client satisfaction score. We can also include questions about the quality of the construction project, meeting deadlines and communication with the construction team.

15. Incident Rate

Because construction is an industry that involves some risk, accidents do occasionally occur. I would ask our team to report all workplace incidents and calculate an average incident rate per project, per reporting period or per year. Strive to keep our incident rate as low as possible and identify commonalities in the type of site accidents that occur.

16. Budget Variance

It is the difference between our original budget and current spending. Projects in the construction industry can often reach multi-million dollar contracts with extremely expensive material and labor costs, so staying on budget is a top priority. Constantly measuring budget variance enables us to make small cash flow adjustments to follow our budget and meet client expectations. We can also track how often we meet our expected budget for each project, exceed our budget or spend less than the projected budget.

In addition, I would set up an effective Key Performance Indicator (KPI) tracking and reporting framework. This can help our firm complete more projects on-time and on-budget. This accomplishes the ultimate goal of maximizing profitability and gaining competitive advantage. This includes:

- Maintain real-time data monitoring - Leverage digital tools like mobile apps, IoT sensors, drones, and AI to enable dynamic tracking of benchmarks.
- Set schedules for periodic KPI reviews - Daily, weekly, or monthly depending on metric.
- Automate data collection where possible - Minimizes manual measurement errors and saves time gathering metrics.
- Use visual tools like dashboards to display KPI tracking and insights - Enables rapid and clear data interpretation.
- Do post-project reviews on completed jobs - Formal assessment of KPI performance helps replicate success and prevent future issues.
- Foster culture of data-driven decision making - Get teams thinking proactively with metrics and facts vs. reactive thinking.
- Link KPIs to individual employee goals - Connects day-to-day work to high-level objectives and clarifies expectations.
- Encourage open discussion around changes needed based on KPI insights - Then follow through to drive continuous improvement.

6. CONCLUSION

The US construction industry is facing a shortage of skilled labor. The shortage is due to a combination of factors, including the retirement of the old generation, a shift in cultural attitudes towards flexible work, and a lack of investment in training and development. The labor shortage is causing a skills gap, which the Coronavirus (COVID-19) pandemic has exacerbated. The shortage is leading to unfilled positions and job openings. The labor gap cuts across multiple areas in construction

industry, including civil engineers, mechanical engineers, electrical engineers, architects, surveyors, skilled trades, HVAC technicians, and plumbing. The construction industry labor shortage is quite serious, and some areas of the country have labeled the shortage of workers in residential construction as a crisis. A lack of skilled construction workers means that staff on site simply lack the knowledge and experience to perform tasks in the most effective and efficient ways. This creates delays and cost overruns, with rework. Adding to the current situation, the future will likely bring even more pressure on construction output. More work under an unforgiving schedule means teams must move faster and potentially take shortcuts to minimize delays, which translates into a higher chance of safety issues and quality problems. Unfortunately, the trends suggest the shortage is unlikely to end any time soon. In fact, many construction companies reported that a third of their current staff are likely to retire in the near future. Large companies are more likely to report this level of pending retirement. This may be because larger firms are more likely to have workers that have been with the company for decades, going from entry level to senior roles. It is hard to overstate the impact of such a loss. When a worker retires, someone stepping into their role is unlikely to be a one-to-one replacement. With 30 to 40 years of experience, a retiring employee is taking years of wisdom and institutional knowledge with them. One countermeasure being deployed by many firms, is construction technology. Considering the severity of the workforce shortage and the likelihood of it increasing, it is clearly important to many specialty contractors to optimize the productivity of their current workers. When labor is short, contractors get creative in order to meet their project delivery commitments. Where you have quality issues, you have construction defect claims and subcontractor default claims sure to follow. Where you have safety issues, you have injuries and workers compensation claims. Not to get political, but there is one additional factor that contributes to the lack of available manpower on job sites, and that is the politics surrounding immigration laws and border control affecting contractors' ability to recruit migrant workers. Restrictions on immigration are having a substantial impact on the availability of laborers.

Although the statistics are dire, the future is not. Necessity is the mother of invention, as the proverb goes, and we do not need to look very far to find colleges and universities, businesses, industry associations and individuals bringing innovative new programs to light to help attract, train, and retain construction industry workers. Improving productivity can be accomplished across multiple domains of technology investment, but the general idea is that digital tools and platforms make the job easier and faster, especially for the younger generation of workers. Having grown up and worked in a world where high-tech tools are commonplace, these younger team members are more likely both to feel at home using them, and to press for their adoption in the workplace. Construction is a resilient industry that has overcome many challenges throughout the years and will surely overcome the current workforce shortage. The question is, what do we want it to look like when it bounces back? Let us reimagine construction as the attractive, challenging, unique, and rewarding business that we know it to be. Building a strong, sustainable pipeline of quality construction professionals that can meet the diverse and imminent needs of the industry is of great importance and will pay dividends to the industry and the marketplace at large.

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