

Productivity and Labor Challenges in the Construction Industry

Identifying root causes, exploring avenues for contractors to improve profitability, efficiency, and labor access

November 2022



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Introduction

The construction industry is one of the oldest and largest in the global market. But in the last decade – despite colossal investments in capital projects, technological advancement and engineering innovation – the industry nevertheless faces substantial challenges: the workforce is aging, productivity gains are lackluster, and the industry struggles to keep up with technological innovation. The team at Trunk Tools sees these industry challenges as opportunities, and in the research below we identify high return-on-investment approaches to increase productivity, profitability and workforce participation.

Background

The global construction industry constitutes 13% of global GDP, generating over \$10 trillion in annual revenue.¹ The domestic US construction market topped \$2.7 trillion in 2021 alone, accounting for over 4% of US GDP² and employing over 7.5 million people – roughly 5% of the American workforce.³ And it's still growing: spending has continued to increase year-over-year for nearly two decades, and most industry executives forecast continued expansion.

Furthermore, the industry's positive externalities are virtually incalculable: construction constitutes the infrastructure on which many other economic sectors rely. This industry is, finally, inextricably tied to the story of America, providing countless opportunities for generations of Americans willing to work hard. Despite its growth, the construction industry faces serious headwinds. Even while technology advances, engineering grows more sophisticated and project complexity expands, contractors see productivity stagnating, the workforce aging and the talent pool shrinking. From 2012 to 2015, only 25% of construction projects came within 10% of initial deadlines.⁴ Labor challenges are also significant: from the difficulty of finding skilled workers (88% of contractors struggle), to the extremely high turnover of these hires (topping 65% in 2021).⁵

¹ McKinsey and Co, "Reinventing Construction," McKinsey Global Institute, 2017.

² Zippia, "25 Essential US Construction Industry Statistics [2022]: Data, Trends And More," 26 September 2022. [Online]. Available: <https://www.zippia.com/advice/us-construction-industry-statistics/>. [Accessed 17 November 2022]

³ Bureau of Labor Statistics, "Measuring productivity growth in construction," January 2018. [Online]. Available: <https://www.bls.gov/opub/mlr/2018/article/measuring-productivity-growth-in-construction.htm>. [Accessed 17 November 2022].

⁴ Ibid., Zippia

⁵ Ibid.

Challenges

Lackluster Productivity Gains

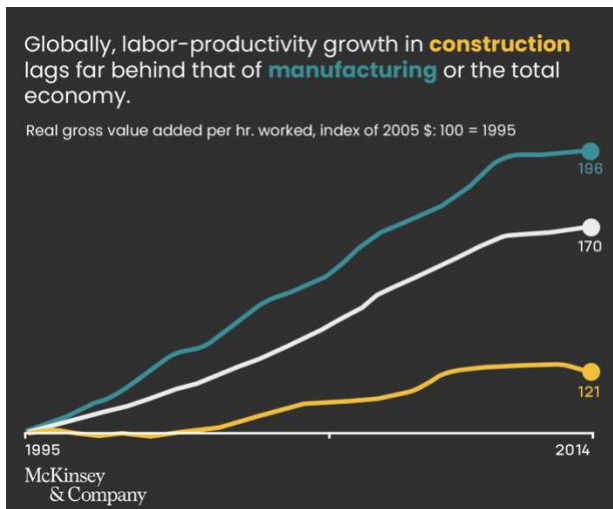
Even though the construction industry is growing overall, productivity of construction firms has struggled to keep up, with most construction categories demonstrating slower growth than other industries.

Industry	Years	Direct labor	Direct subcontractor labor and	Average productivity growth		
				Total	Manufacturing	Nonmanufacturing
Single-family	1987–2015	1.1	1.1	2.2	2.0	2.4
Multifamily	1987–2015	3.7	1.7	2.2	2.0	2.4
Highways	2002–2015	0.0	-2.4	1.6	1.2	2.0
Industrial construction	2006–2015	7.0	7.5	0.8	0.3	1.3

The table above⁶, from a 2018 Bureau of Labor statistics study, underscores construction’s lackluster productivity gains. The table above displays the productivity change of each industry over the noted time period, relative to broader manufacturing and non-manufacturing benchmarks. For three of the four construction sectors (including the two largest: single-family and highways), productivity growth lags the industry benchmark (and for Highways, is net negative).

Increasing Project Complexity

Advancements in design software, computing and manufacturing technology have led to increasingly complex executional demands for construction teams.. Tasks, techniques, organizations, and processes have become harder to manage, requiring more specialized



⁶ Ibid., Bureau of Labor Statistics

Notes (from original publication): The total column under “Average productivity growth” refers to the total industries included in the Division of Industry Productivity Studies database, including both the industries in manufacturing and nonmanufacturing. The last three columns (also under “Average productivity growth”) refer to unweighted averages of all the individual industries, rather than a weighted average. We use unweighted averages so that one can more readily compare the construction industries with a typical industry in the database. In contrast to the main text, [this table] examines data only up to 2015 because measures for some of the comparison industries have not yet been updated to 2016. All data in this table report annual rates of labor productivity growth.

knowledge from technicians, laborers, managers and executives alike.⁷ To accommodate the increase in complexity, companies are pressured to adapt by expanding headcounts and further upskilling workers.

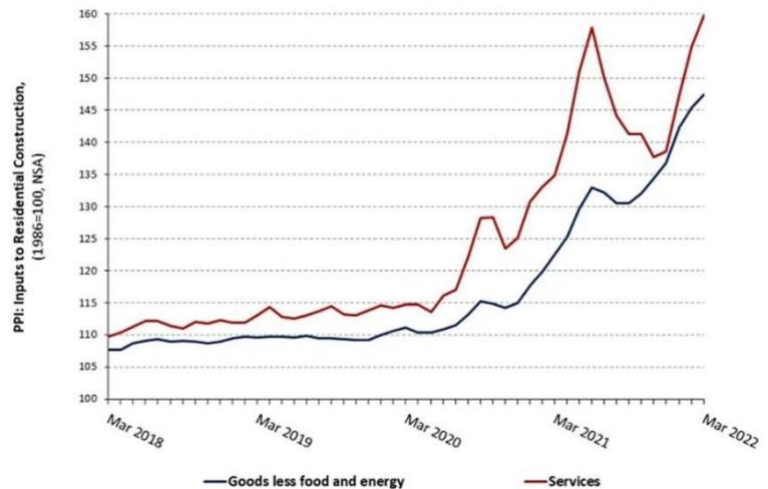
Increasing Material Costs

The cost of construction materials has increased nearly 50% since 2018, driving project price tags sharply higher. As project sponsors wrestle with budgets, they are forced to make concessions to offset rising material costs – generally by reducing their investment in labor.⁸

Increasing Labor Costs

Average earnings for production and nonsupervisory employees in construction have risen 6.3% year-over-year since 2021, marking the highest gain in 40 years.⁹ Furthermore, the bulk of these wage increases were for entry-level, unskilled positions. Ultimately, contractors are hiring aggressively, but the impact of their labor budgets (already pinched by material cost inflation) has steadily declined. For the same spend, construction teams are less skilled and less productive. Labor Shortages within the construction labor market, there are a variety of challenges affecting employers as they seek out talent.

Price of Inputs to Residential Construction
March 2018 - March 2022



Aging Workforce

As of 2021, 22% of the construction industry’s workforce is at risk of retiring. According to the Bureau of Labor Statistics, the median age of construction workers is 42.3 years old, and for every new worker, 5 retire.¹⁰

⁷ Q. He, L. Luo, E. Jaselskis and J. Xie, "Construction Project Complexity: Research Trends and Implications," Journal of Construction Engineering and Management, 2017.

⁸ National Association of Home Builders, "Building Materials Prices Rise Further," 13 April 2022. [Online]. Available: <https://eyeonhousing.org/2022/04/building-materials-prices-rise-further/>. [Accessed 18 November 2022].

⁹ ConstructionDive, "Rising labor costs eat away at construction firms’ profits," 23 June 2022. [Online]. Available: <https://www.constructiondive.com/news/rising-labor-costs-eat-contractors-construction-firm-profits/625978/>. [Accessed 17 November 2022].

¹⁰ Bureau of Labor Statistics, "Labor Force Statistics from the Current Population Survey," 2022. [Online]. Available: <https://www.bls.gov/cps/cpsaat18b.htm>.

Recruiting and Onboarding

88% of contractors say they struggle find skilled workers. Of those, nearly 50% have difficult hiring some of the most standard roles: electricians, carpenters, masons, HVAC technicians, plumbers, etc.¹¹ Almost half of those say they have a high level of difficulty finding these electricians, carpenters, masons, HVAC technicians, plumbers, and others needed to complete projects. Because of this shortage, contractors are paying more, missing deadlines, forcing more work on existing headcount – even turning down projects.

Retention

Historically, contractors typically pay a premium to attract and retain employees. These wage hikes are typically justified by the work itself: construction is a more dangerous job, lacking the perks of remote work, climate-controlled offices or flexible hours. But as other industries have ramped up their pay rates in the face of worker shortages and skyrocketing inflation, construction is losing its lead in the wage race.¹²

Slow Technological Adoption/Limited Research & Development

Perhaps unsurprisingly, the construction industry lags other sectors in terms of technological advancements. And while manual processes (pen and paper, excel sheets, ad hoc discussions, etc) are tried and true, and require little to no training, a wholesale refusal to adopt new technologies (software integrations, automation solutions, etc) is not a winning strategy. These solutions promise to improve worker efficiency and enable smoother operations. In a recent survey, 35% of contractors have failed to adopt new technologies due to employee hesitation.

Common Themes

Legacy Business Processes & Limited Technology

Failure to take advantage of new technological capabilities hinders the progress that construction companies aspire to. Often, companies struggle to adopt new technology due to limitations in resources, talent, or workforce buy-in.

¹¹ Ibid., Zippia

¹² Ibid., ConstructionDive

Workforce Acquisition & Retention

Construction work is not for the faint of heart: the job requires physical strain, exposure to elements, travel to varying job sites, and other negative social perceptions. The ability to acquire or retain skill within the industry has always been a challenge, but more so than ever as wages rise in the market, more and more talented employees are leaving for service jobs.

Worker Skill and Qualification

The most experienced individuals are retiring, leaving a large talent gap in their absence. Training young employees takes time and is paramount for success – given that retirement is outpacing new talent 5-fold, there are not enough experienced resources to train new employees. Low wages for inexperienced workers and long lead times to develop a base of skill make the effort worse. The construction industry needs to find innovative ways to attract talent, maintain the knowledge of the retiring workforce, and quickly train the new one.

Solutions

As virtually every aspect of construction work increases in complexity and material and labor costs rise, firms can no longer accept “good enough” results and operations to maintain a competitive edge. We propose solutions on three main axes to deliver the returns construction leaders require to see their businesses grow.

Automation

There are increasing opportunities for firms to take advantage of automation, as demonstrated by the nearly \$4.5 billion investors poured into construction tech companies during 2021. Countless new companies have developed innovative technological solutions aiming to solve the industry’s lasting problems.

Pros: The benefits of automating processes within the construction industry are numerous. First, it greatly reduces human error and increases productivity. Software like Bosch’s RefineMySite or Autodesk’s Construction Cloud gives workers a uniformed tool to develop plans. Verifications within the tools ensure that human error is identified and mitigated before it impacts operations.

Other automation innovations ensure high-quality output, while improving safety levels of construction sites., Companies such as Dusty Robotics enable BIM-driven layouts. While still requiring a human operator, the software does most of the heavy lifting. One step further, WePrintHomes has developed a 3D printer that autonomously lays concrete for a variety of

buildings. 3D printers allow for 24/7 development and provide consistent quality. Additionally, by removing humans from the physical site, they greatly increase safety.

Lastly, innovative prefabrication techniques can decrease the need for new labor and reduce overall productivity woes. Companies such as BROAD Sustainable Building, based in Hunan, China, have developed new prefabrication techniques that allow them to complete construction sites in record time. The most recognized accomplishment for BROAD was their development of Mini Sky City, a 57-story building erected in only 19 days. This means in densely populated cities, the downtime between the demolition of an old building and the construction of a new one can be greatly minimized—reducing lost revenue for building owners.



Cons: Despite the boon of automating, digitizing, and perhaps more broadly, modernizing the construction industry, many challenges remain. One major concern is potential backlash from industry workers. First, they may feel threatened and fear the potential of being replaced by robots. Second, they may resist learning new technologies or cooperating with their employer to ensure their job security remains. The cost of training new employees can quickly become prohibitively expensive for a company in this scenario. Not only does training an employee have a direct cost (on top of already expensive software fees), but there are also the opportunity costs associated with an employee’s decreased productivity while retraining.

Additional direct costs must be considered when implementing new technology. For example, most new technology requires computers and costly hardware accessories in order to be useful. Depending on the number of workers and scale of an operation, the cost of implementing new technology can quickly become prohibitive.

Cultivating New and Diverse Talent

There are many ways to increase the hiring pool for the construction industry. An immediate point of interest is the homogeneity of the industry’s workforce. According to a study conducted by McKinsey & Company, 89% of the construction industry’s workforce is white and over 90% is male. This makes construction one of few industries within the US that does not reflect our broader national demographics.

Managers may consider adopting hiring practices that increase the diversity of their employees. Companies such as Homeboy Industries helps formerly incarcerated individuals obtain jobs within construction. Other companies and organizations assist transitioning veterans, high school students, and others to break into an often-overlooked industry. These groundbreaking initiatives offer companies new opportunities to tap into previously overlooked and untapped sources of new participants to the labor market.

The universal nature of the construction industry and its practices have historically provided an opportunity for immigrants to participate in the US economy. Attracting talent through immigration has become slightly more challenging over the past few years. Regardless, expanding the breadth of people considered for employment within the industry may also expand the access to talent at a time when it is needed.

Pros: Diversity of thought and experiences is shown to dramatically increase the creativity, effectiveness, and profitability of companies. During many of our interviews, numerous individuals identified diversity as a key highlight of their day-to-day jobs. Most importantly, it addresses two fundamental industry issues: a lack of candidates from traditional backgrounds and an aging workforce. By including previously overlooked communities such as veterans and formerly incarcerated individuals, the industry can access a deeper talent pool. Introducing high school students and young adults to the industry can ensure a long-term solution to the labor shortage. Unlike the previous solution, increasing the size of the talent pool requires little to no technology and provides long-lasting and highly rewarding effects.

Cons: Although there are many benefits to increasing the number of workers within the construction industry, it is not without its challenges. Employers have long struggled with attracting new talent to such a laborious profession. Younger generations are shifting away from manual labor to other competitive and more attractive industries. However, we firmly believe employers have more tools at their disposal and the impact will surely pay dividends, but those results have a long lead time and require patience and determination.

Increasing Productivity Through Incentive Alignment

The construction industry can increase the productive outputs of our existing workers. While the variety between projects may be substantial, on an individual task-level, construction is highly repetitive. By leveraging technology to address inefficiencies on an individual level where tasks are highly repetitive, productivity gains can be unlocked. The implementation of task-based incentives has been proven to work particularly well.

One of the easiest ways to implement task-based incentives is to recognize productivity heroes. By providing awards for individuals or teams who push for more productivity and implement project improvements, this positive behavior is signaled as desirable, rewarded, and reinforced. Individuals recognized as productivity heroes—those who actively save the company money—should be recognized, rewarded, and retained by the company.

Goals should be realistic and achievable, leveraging information from the field and formulating baselines that can be translated into clear tasks and directives. How long should pouring concrete take for a specific area? How quickly can a steel support be erected? How many days does it take to install one floor's worth of drywall? Project managers should ask themselves these questions and, in collaboration with superintendents, foreman, and workers, determine realistic timelines for each. As a bonus, special “stretch goals” can be developed as motivational tools.

Finally, it is important to reward the employee once the task is completed. There must be a carrot at the end of the stick, placed far enough forward to motivate pursuit, but not so far as to discourage effort, adherence to specifications, or to safety standards. At the end of the day, safety and quality are always the most important factors.

Pros: This method is a process change that utilizes the existing workforce, enabling companies to begin using it right away. With thoughtful implementation, process changes are quick, easy, inexpensive, and faster to implement than technological or engineering changes. There is no need to train workers on new platforms, increase the employee base, or acquire new technological systems. This low-barrier to entry approach allows for leadership to adopt it with minimal employee resistance. Since this solution addresses workers’ fundamental desires to increase their earnings and feel ownership of and motivation for their work, and employers desire to improve productivity, everyone within the organization is working towards shared goals. An approach yielding greater productivity that results in higher profits while also monetarily rewarding workers is a win-win scenario for all involved.

This process provides a straightforward solution to the industry’s stagnation of throughput growth. Operating similarly value engineering on the micro-scale, the company shares savings with the workers. First, this allows for an aligning of incentives between employees and management. Second, it can be implemented anywhere almost immediately. Third, it provides an attractive ROI for all participating parties. Increasing worker productivity is the fastest way to mitigate the deleterious effects of the labor shortage problem.

Cons: Although we believe utilizing the existing workforce through the implementation of task-based incentives is the most direct and useful solution, there are also downsides to consider. First, there is the obvious concern about labor union reactions. Historically, task-based incentives have

been perceived by some as negative. Although there have been some cases of misuse, modern regulations have significantly reduced the likelihood of bad actors.

To ensure maximum benefit, companies must invest time, energy, and resources in the proper training of pertinent leadership (foreman, superintendents, project managers, etc.) in the correct utilization of the tool. Payouts must reflect an accurate reward for the task completed. The solution for the optimization problem is simply where productivity, safety, and quality meet. If handled improperly, some companies may find diminishing returns in task-based incentives.

Conclusion

The construction industry faces many challenges today. With an ever-growing demand for new sites, projects, and buildings, but decreasing capacity to meet it, the industry needs to adapt. For the US and the global economy to overcome the labor shortage chasm, companies must construct a sturdy bridge utilizing all three of the solutions proposed above. While technological advances catch-up with the growing needs of industry and the long-term benefits from broadening the labor pool will have an effect, companies can resort to task-based incentives to maximize employee utilization, retention and motivation, right now.

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