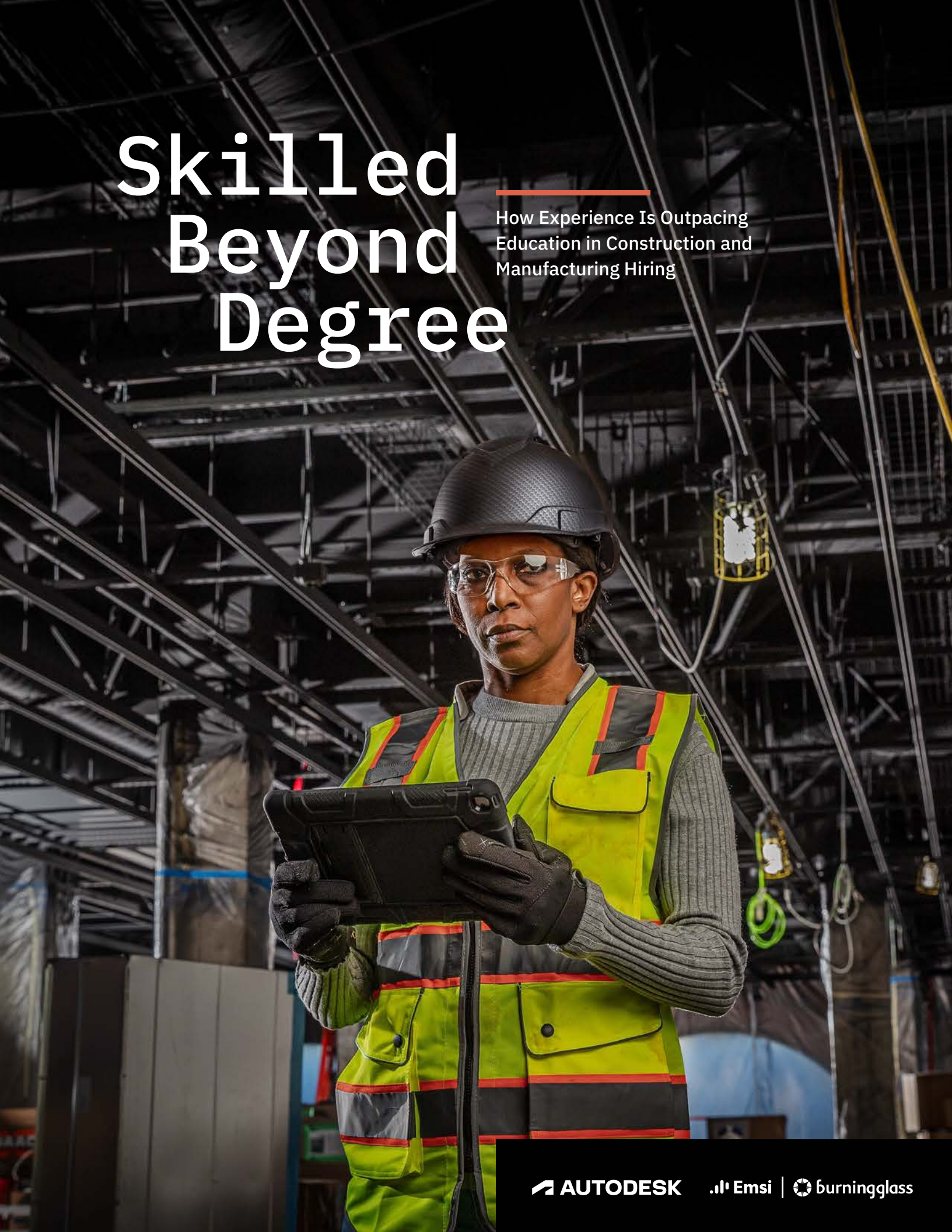
Skilled Beyond Degree

How Experience Is Outpacing Education in Construction and Manufacturing Hiring



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Skilled Beyond Degree

How Experience Is Outpacing Education in Construction and Manufacturing Hiring

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Executive Summary

Jobs in construction and manufacturing face technological changes and accelerating digital transformation. This report, written by Emsi Burning Glass and commissioned by Autodesk, examines trends in the United States, United Kingdom, and Germany to identify the jobs, skills, certifications, and education that are in demand today, and will be critical for the future.

Key Findings

- Skills are key. In construction and manufacturing we find a shift in job postings away from requiring a bachelor's degree, and towards no explicit education requirement. This suggests that skills are paramount, for both the worker and the employer.
- The shift away from bachelor's degrees does not mean a demand for less sophisticated skills--quite the opposite. Data skills and management skills play an increasing role in these fields, suggesting the complexity of challenges facing construction and manufacturing.
- Those skills that are poised to disrupt, meaning they are hard to find and expensive to hire for on the part of employers, are centered around data analytics, business oversight, management, and related skills.
- Renewable energy related roles in manufacturing are some of those poised for the greatest growth in the next five years, emphasizing the need for adaptation to new methods and new technology.
- Workers with these skills will be in high demand and able to command higher pay. If employers are going to meet this demand, they're going to have to establish a talent strategy that ensures they have the workers they need.
- Across roles and across geographies, skills are showing critical importance, while specified education levels are in fewer and fewer postings. This trend suggests that investment in skills, on the part of the employer and the job seeker, is of paramount importance. Skills can transition a worker from one job to another and help both a worker and an employer adapt to ever changing technology and technological advances. This story is a story of skills.

Introduction

Jobs in construction and manufacturing are often at the center of the conversation when it comes to the changing nature of work. Two-thirds of construction executives believe digital transformation will only accelerate as a result of COVID-19, and 76% of manufacturing executives polled in a prior study intend to increase their investments in digital initiatives. These industries are clearly undergoing significant digital transformations. This report is designed to provide insight into the scope and nature of specific roles within the manufacturing and construction industries, and to identify the jobs, skills, certifications, and education that are most in demand today and will be in the future. This report, written by Emsi Burning Glass and commissioned by Autodesk will focus on three geographies, the United States, the United Kingdom, and Germany.

The nature of skills required among the construction and manufacturing workforce is, and will continue to, change dramatically, with transferable skills enabling workers to easily shift jobs becoming more important, and advanced education becoming less so.

In construction in the United States, 2020 saw a shift away from job postings requiring bachelor's degree qualifications for the first time, while in manufacturing, most postings have been without a specified level of education since 2016. This points to the fact that employers are shifting their focus from education to skills in search of a strong employee. In the United Kingdom, 82% of job postings in construction and manufacturing didn't require formal education in 2020, while in Germany, the norm is to request short-cycle tertiary education. There has also been a slow and steady decline in job postings requesting a bachelor's degree since 2016 in the country.

With these education trends in mind, we believe it is critical to understand the skills and competencies most important in both construction and manufacturing. This will assist workers in preparing themselves for success in the labor force and will inform firms about where they can best invest in human capital in preparation for the future.

This report focuses on roles that perform manufacturing and construction tasks within firms that are in those industries. These roles range from entry-level to advanced career and cross the educational and experiential spectrums.

Through this lens, we have three main objectives

1. To understand the construction and manufacturing ecosystems through an analysis of skills and occupations

2. To identify skills and occupations that are likely to experience disruption in the near future, and to make recommendations based on these changes

3. To predict the skills likely to be the most important for workers and employers in the ecosystem moving forward, so that all parties involved can adapt and thrive

The jobs of construction and manufacturing show many common themes across geographical areas:

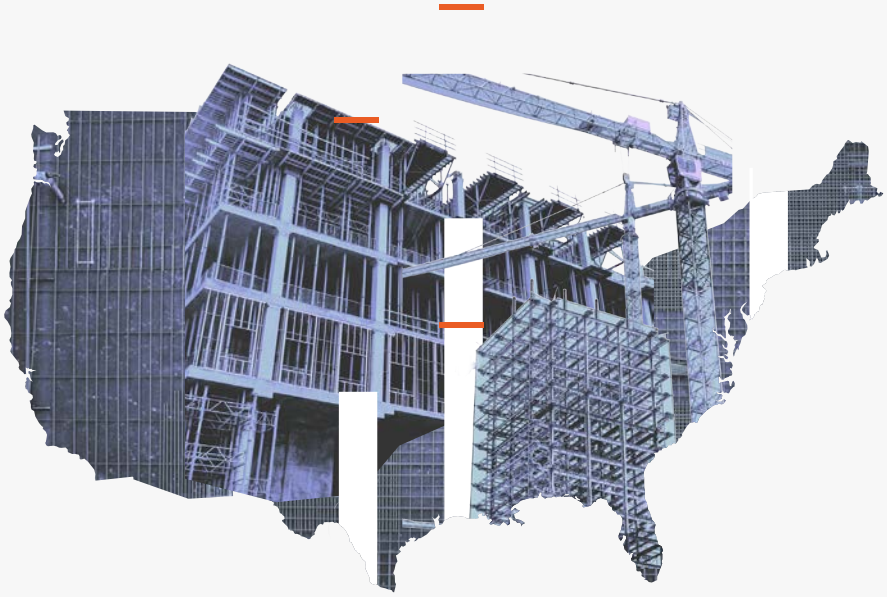
The influence of technology is crucial. Programming skills, enterprise resource management, and software development skills are found to be in demand in these industries in all three countries. Roles that require these skills tend to pay higher salaries, provide more stability and are increasingly in-demand.

In the United States and the United Kingdom, a significant portion of construction and manufacturing job postings do not list a specific education level required of applicants. This suggests that often, skills and competencies are more important than formal education. This presents an opportunity for training programs to step into skill or re-skill workers in a way to prepare them for the jobs available today, and those likely to be available in the future, without requiring lengthy degree programs.

The evolution of technology brings with it the risk of some tasks becoming automated, while also creating new roles in these industries. With that in mind, we can provide suggestions for workers in occupations at risk of automation, on how best to transition to roles that are unlikely to be automated, while minimizing the amount of retraining necessary. While this analysis is only done for jobs in the United States, the predictions and recommendations can inform other labor markets including the UK and Germany.

To the extent possible given data limitations, we describe the current state of construction and manufacturing jobs as well as predictions for the near future across geographies. In some instances, data for one or more geographies may be unavailable. Where that is true, we look to the data and predictions made for the United States economy, since it is likely a reasonable indicator of general labor market trends.

This analysis was conducted using Emsi Burning Glass job posting data for the United States, Germany, and the United Kingdom and examines the full year of 2020. Through job postings, we can identify skills, education requirements, and other job characteristics to inform an analysis of the current and future state of construction and manufacturing jobs. Jobs are defined as being in construction, manufacturing or both based on a combination of industry and occupation. For a definition of the categories, see the appendix.



Chapter 1

The United States

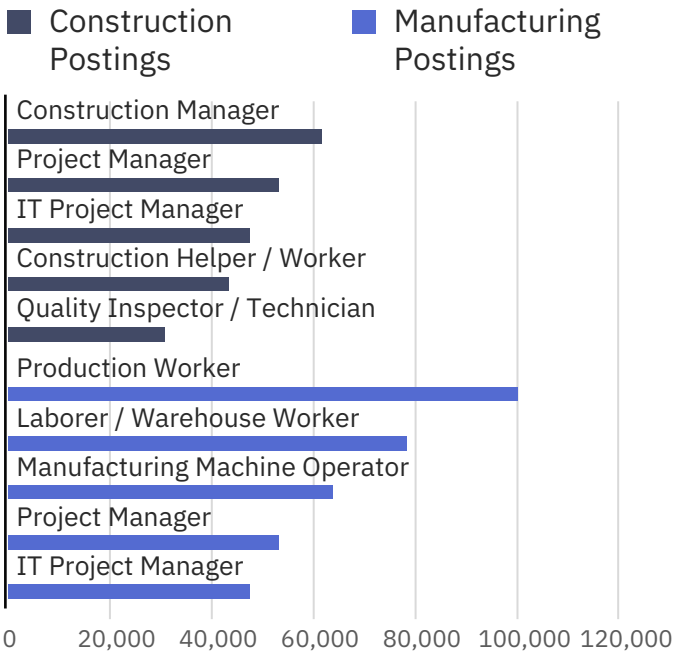
The Roles of Today

Within the United States, we find 868,460 job postings across 69 unique occupations and 229 unique industries within construction and manufacturing in 2020 – despite pandemic-induced upheaval. Technology and management are at the forefront of the skills and roles most in demand across the US, and projections suggest that these will continue to feature prominently. While levels of job and skill demand in some cases are lower than those prior to the pandemic, trends should still be considered as indicators of current and future demand.

Automation, technology, and the constantly changing nature of the global economy are likely to impact both current and future workers and employers in construction and manufacturing. As workers ensure that they are equipped for the jobs of today, and for those to come, skills are of paramount importance. Having the right skills improves a worker's chances of landing and retaining a job, leads to increased income, and provides a pathway for positive change and growth.

The most in-demand occupations in construction and manufacturing are listed below, along with the number of job postings for each in 2020. We first note that in the United States, some of the most in-demand roles are management positions, and likely all have a need for at least some technical skills, with many requiring extensive technical skills.

Figure 1: Top Roles in Construction and Manufacturing in the United States



Source: Emsi Burning Glass 2021

Methodological Note: Occupations may fall in both Construction and Manufacturing. See the appendix for details.

Construction and manufacturing roles are often lucrative, with three of the most in-demand occupations commanding an average salary of more than $80,000 per year nationally, which is significantly above the national average of just over $54,000.

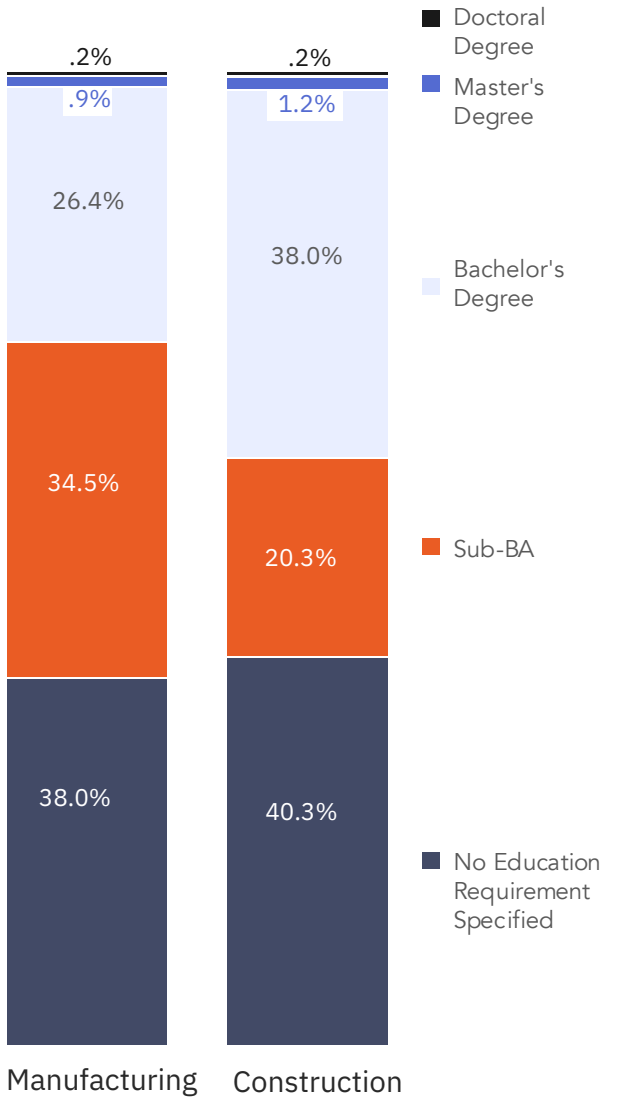
Figure 2: Average Market Salary for High-Demand Occupations in the United States

Source: Emsi Burning Glass 2021

Many job postings for roles in construction and manufacturing explicitly require a bachelor's degree or less. However, there are a significant proportion of job postings in both construction and manufacturing that do not explicitly list an educational requirement, and instead seem to rely on skills and competencies to identify workers that are most suitable for the position. The share of construction job postings that omit an educational requirement has been increasing since 2016, suggesting that skills may be more important than education in these roles. In manufacturing, postings lacking a specific educational requirement have outpaced all other educational requirement categorizations since 2016.

Figure 3: Education Requirements by Role in the United States

There are several certifications that are requested by employers who are hiring for construction and manufacturing roles. Most of these certifications across both sets of roles are for project management and the ability to obtain a security clearance.



Source: Emsi Burning Glass 2021

For the purposes of this report, skills are broadly defined as the capabilities and competencies that are requested within a job posting such as the following figures. Skills can be specific, such as Autodesk Revit, or broader and more general like project management.

Although the same skill or competency can mean different things across different occupations or industries, all that can be identified is the skill or competency itself. It is important to consider how it may be utilized across roles when interpreting any findings in this report.

Given the top demanded roles in construction and manufacturing, it is not surprising that the top requested specialized (non-software) skills requested in 2020 largely revolved around management capabilities.

These non-software skills show the importance of management and related skills, as well as quality management and assurance. These skills can come from education or experience, so workers enabled with them can be found at many levels. Skill recall measures the percent of postings requesting a given skill, so for example, 34.9% of construction jobs requested project management skills in 2020.

When it comes to software skills, there is strong demand across construction and manufacturing roles for software proficiency, including programming skills and productivity applications.

Workers who have sought-after skills can often command more money. From job posting data, it's possible to calculate salary premium or the additional compensation above the average for a given occupation that a skill commands.

There is a clear need for workers with management skills in the current market across both construction and manufacturing. This echoes the specialized occupations with the most job postings in 2020, as well as the skills in highest demand. This apparent management shortage is something that can be filled by existing workers who upskill into these positions, as well as workers who are educated for the role at the outset of their career.

Figure 4: Top-Requested Certifications by Role in the United States

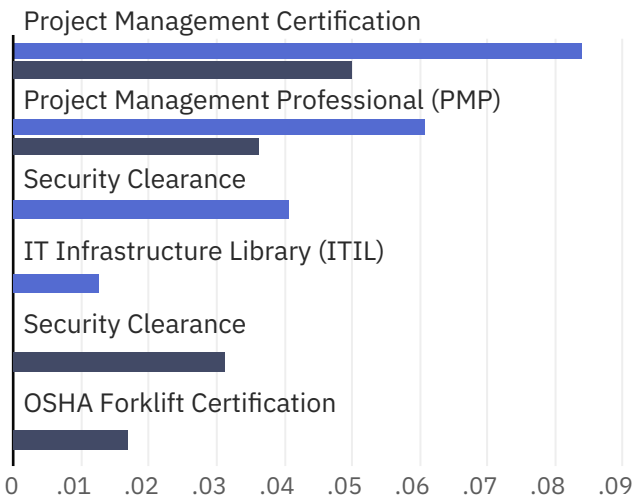


Figure 5: Top Specialized Skills in the United States

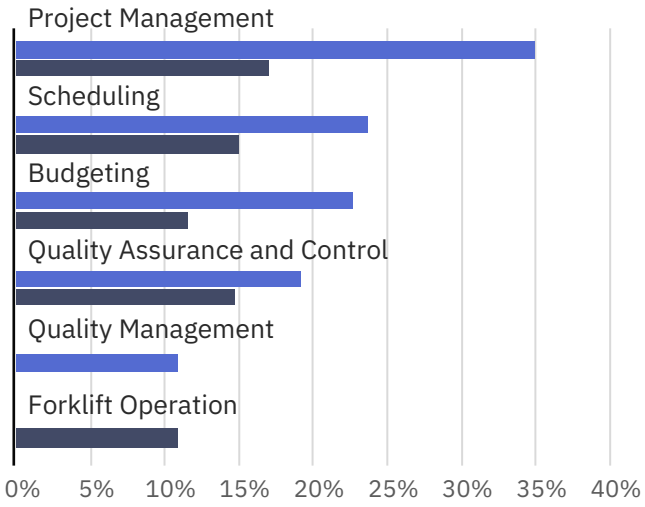


Figure 6: Top-Requested Software Skills by Role in the United States

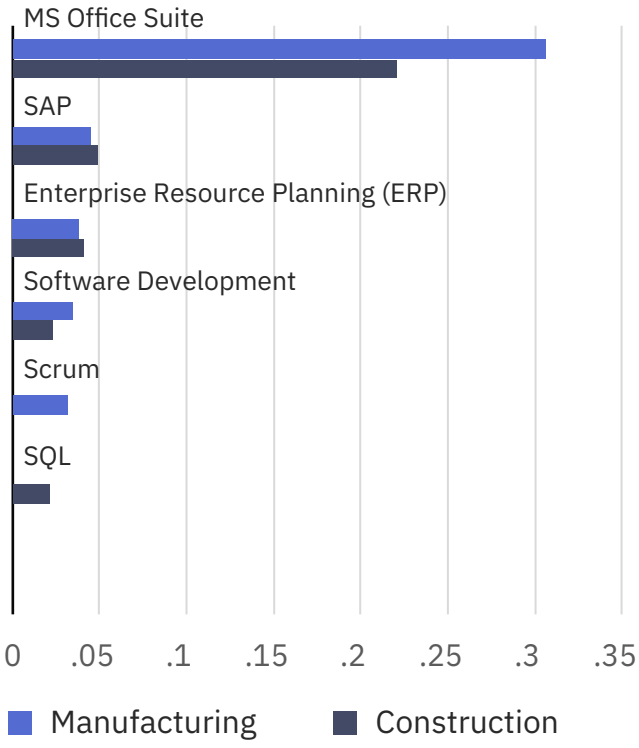


Figure 7: Skills Commanding the Highest Salary Premiums in the United States

Source: Emsi Burning Glass, 2021

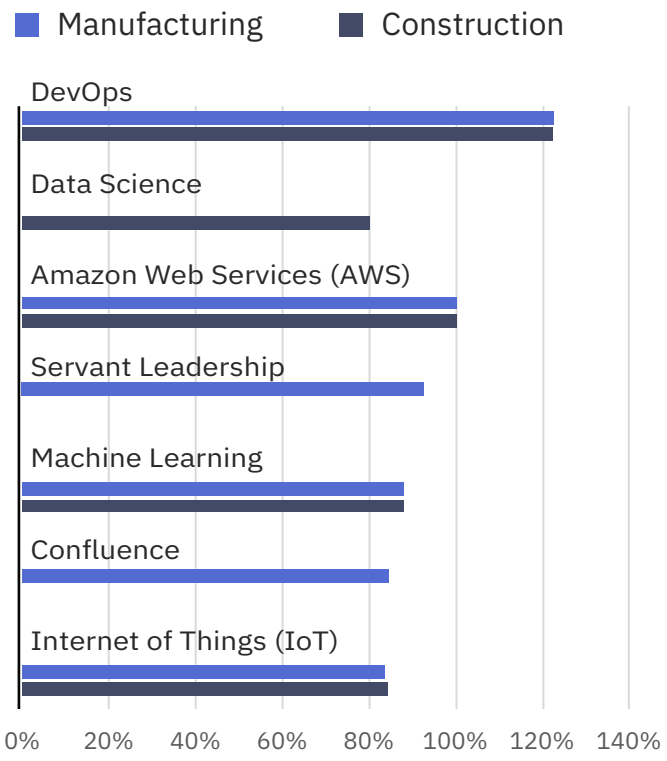
A Look at the Future

Like so many other jobs in the United States economy, roles in construction and manufacturing are poised to see changes in coming years. To ensure that workers are best prepared for the roles of the future, it is prudent to look to the fastest-growing skills in construction and manufacturing roles.

These projected growth rates indicate increasing demand over the next five years. However, it is not just growth that is likely important in identifying which skills may be most beneficial for a worker to have. Skills deemed to be disruptive are those that have a high growth rate and are costly to fill on the part of the employer, based on salary premium. Skills that fit this disruptive profile are likely mission critical for a business, while also being very hard to find. Businesses that can source or build talent in these areas are more likely to be future ready than their counterparts who do not.

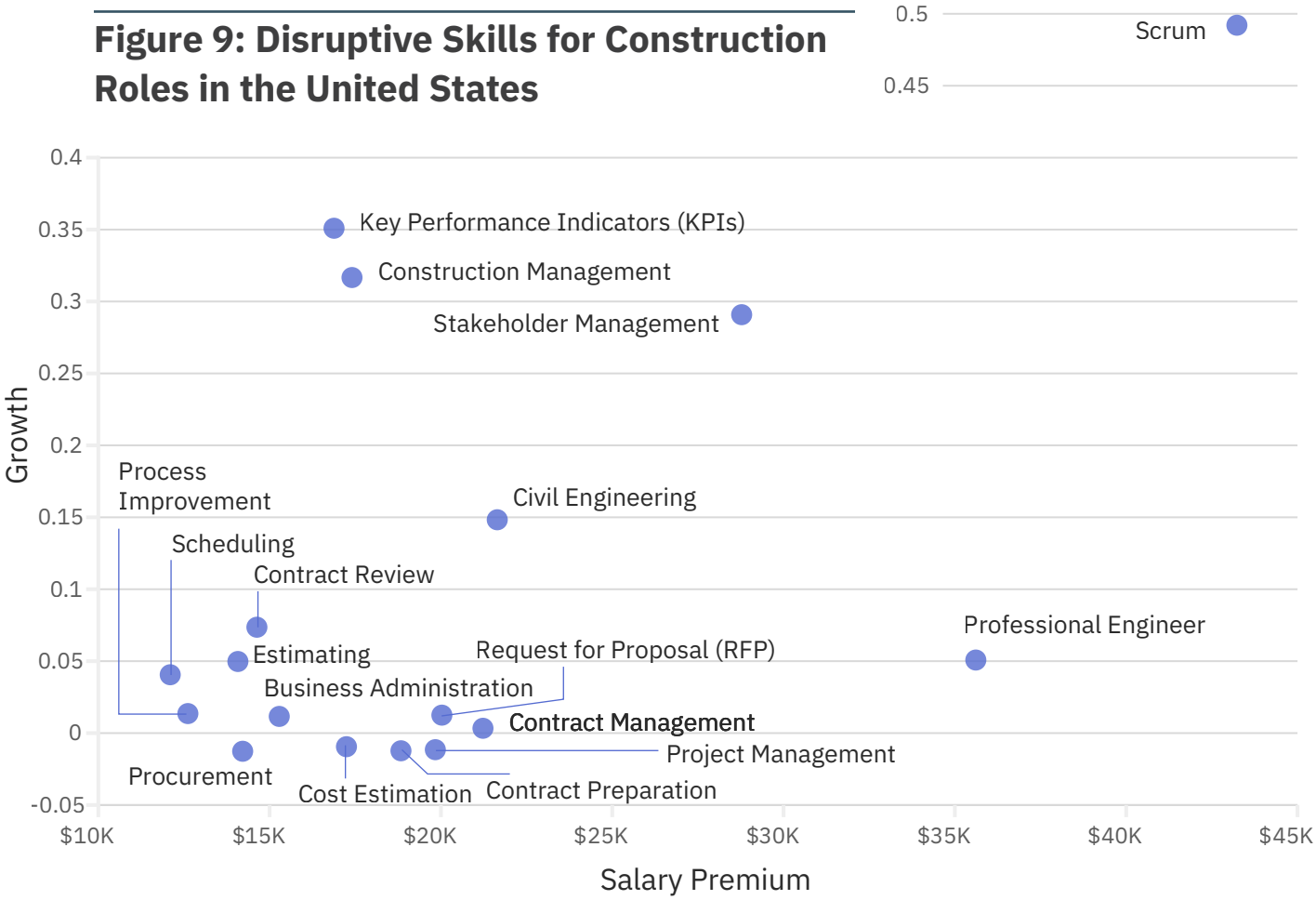
Disruptive skills in both manufacturing and construction over the coming years are likely to center on business oversight, management, and related skills. Workers who are equipped with these skills and competencies are likely to command a salary premium and be in higher demand by employers. If employers are going to meet this demand, they're going to have to establish a talent strategy that ensures they have the workers they need.

Figure 8: Skills with the Highest Projected 5-year Growth in the United States



Source: Emsi Burning Glass 2021

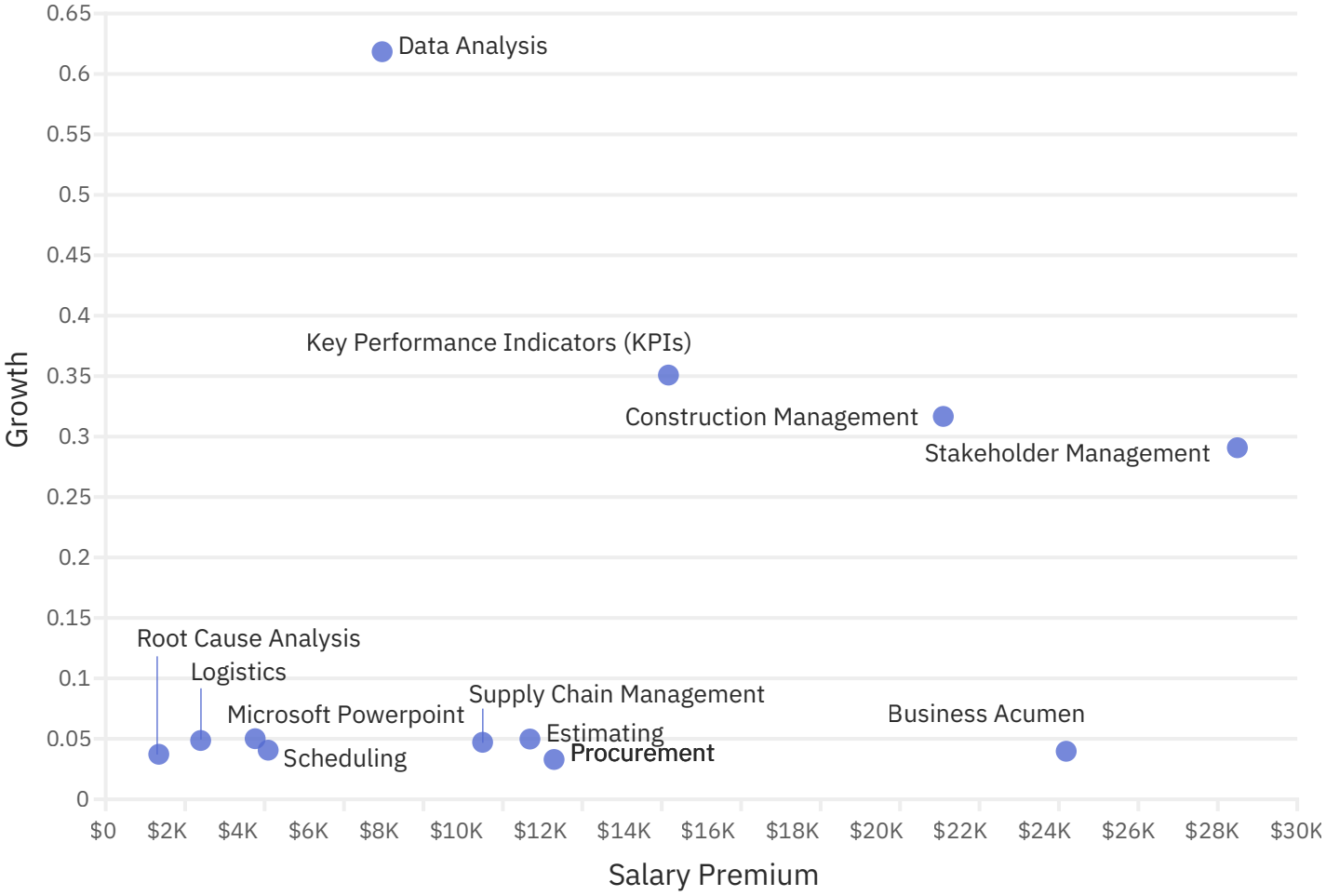
Figure 9: Disruptive Skills for Construction Roles in the United States



Source: Emsi Burning Glass 2021

The skills and competencies poised to be the most disruptive in construction roles show a few notable themes. First is the theme of management and oversight skills, with stakeholder management, a critical skill for management of large projects commanding very high sums of money for contracted firms, slated as one of the most disruptive over the next five years. The importance placed on management, administration, and process skills may be a harbinger of a departure from the use of local firms just for the sake of location. It may also be a product of the agglomeration of firms across regions.

Figure 10: Disruptive Skills for Manufacturing Roles in the United States



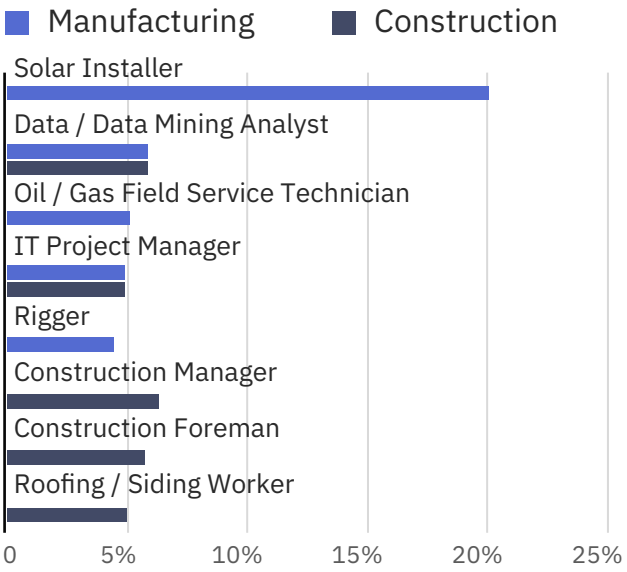
Source: Emsi Burning Glas 2021

In manufacturing roles, disruptive skills and competencies are centered around management, business development practices, and data analysis. These skills and competencies are projected to grow in the coming five years and command a strong salary premium, suggesting that employers find these roles harder to fill. Logistics and supply chain management were brought to the forefront of public awareness during the global COVID-19 pandemic, and their importance is projected to continue in years to come.

While growing and disruptive skills are important across roles, it is also important to consider the roles themselves that are poised to have the largest growth in coming

years. Construction and Manufacturing occupations poised to experience the highest growth in employment in the next five years are shown in figure 11.

Figure 11: Roles Poised for Employment Growth in the Next 5 Years



Source: Emsi Burning Glass 2021

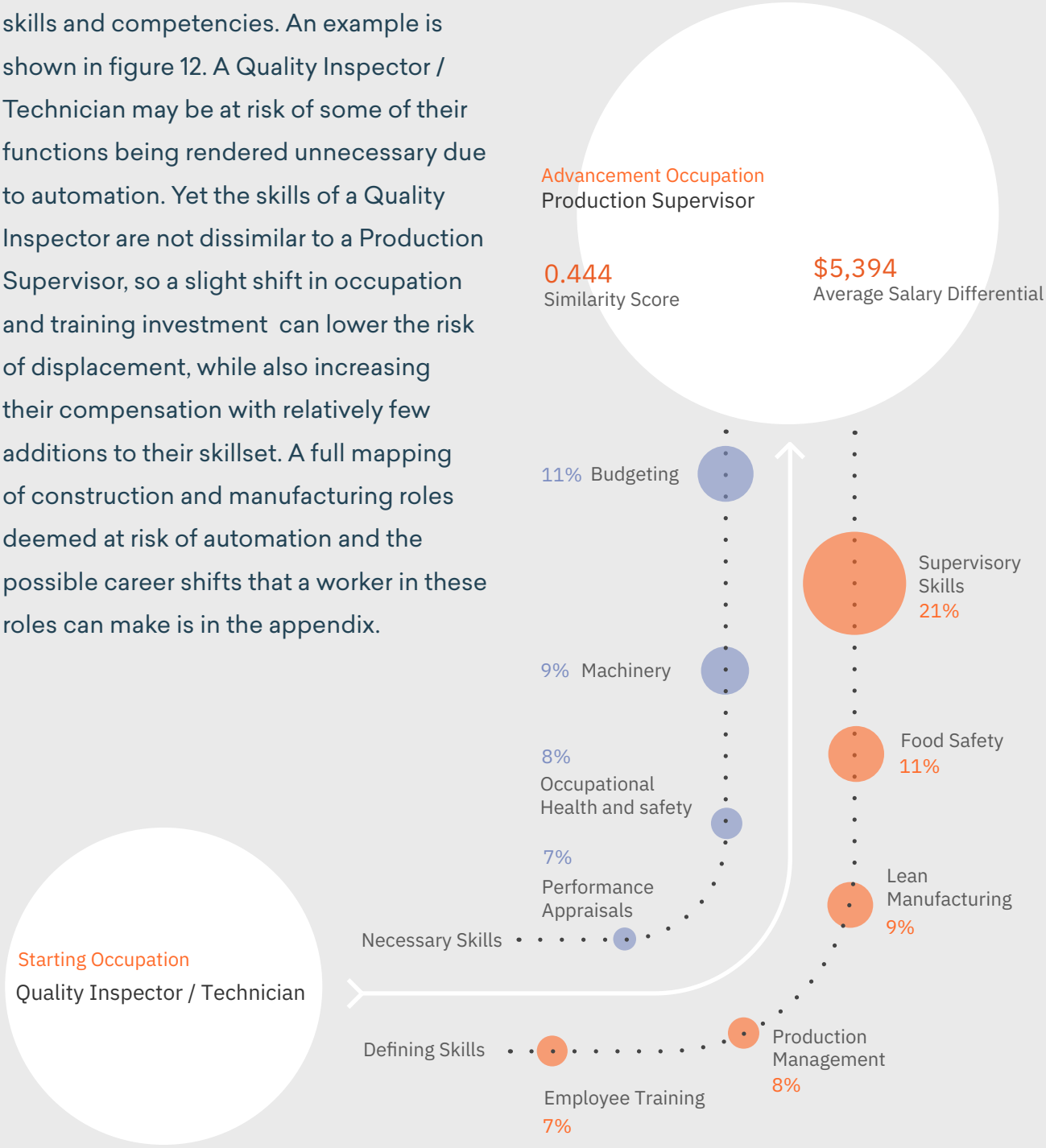
Methodological Note: Occupations may fall in both Construction and Manufacturing. See the appendix for details.

Notable amongst the occupations poised to grow in both construction and manufacturing are those revolving around technology; Data / Data Mining Analyst and IT Project Manager. This demonstrates the strong role that data and technology are currently playing and will play in the future and echoes the findings of data analysis skills and other data-driven decision-making methods as some of the most disruptive skills. Also notable are the energy-related roles that surface in manufacturing, with renewable energy positions showing as top growing occupations.

As technology evolves and industries transform, many jobs will experience change. Change driven by the emergence of automation may cause tasks to change, and the workers performing these tasks may be impacted by machines, which will either compliment the tasks they execute, or complete them on their behalf. While the impact of automation on a worker's career may cause concern, workers can leverage the skills they already possess to pivot to a new role that is both lucrative and less susceptible to automation in the longer term.

For occupations that are at a high risk of automation, there are one or more occupations that make a relatively straightforward transition for the worker, requiring only a handful of additional skills and competencies. An example is shown in figure 12. A Quality Inspector / Technician may be at risk of some of their functions being rendered unnecessary due to automation. Yet the skills of a Quality Inspector are not dissimilar to a Production Supervisor, so a slight shift in occupation and training investment can lower the risk of displacement, while also increasing their compensation with relatively few additions to their skillset. A full mapping of construction and manufacturing roles deemed at risk of automation and the possible career shifts that a worker in these roles can make is in the appendix.

Figure 12: Sample Career Pathway for a Role at Risk of Automation in the United States



Source: Emsi Burning Glass 2021

As shown in fig. 12, the Quality Inspector / Technician could add some or all of the necessary and defining skills needed to make the transition between roles. For all career pathways, we have studied job posting skill requirements to identify the transitions that would involve the least amount of retraining needed, ensuring that the transitions suggested are reasonable, as well as lucrative.

Workers in construction and manufacturing are likely to see many changes in the coming years, and often these changes are going to revolve around technology. Optimizing processes, data-driven decisions, and streamlined management practices are all poised to disrupt these roles. Workers with skills in these areas will likely be rewarded both financially and with stable employment. Workers who are vulnerable to technological disruption need not fear the change, as it does not require a drastic re-skilling effort, but rather they can build upon their current skillset to pivot to roles that are similar in skill requirements but provide more stability. Using the career pathways laid out for workers most at risk of automation, roadmaps for future success can be made.

Chapter 2:

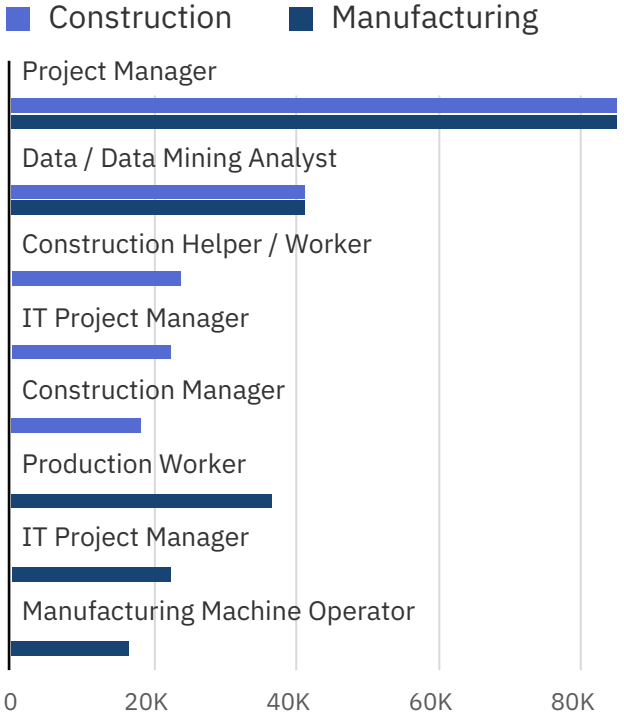
The United Kingdom

The Roles of Today

Within the United Kingdom, we find 390,476 job postings across 69 unique occupations and 38 unique industries within construction and manufacturing in the year 2020 – despite a tumultuous year driven by pandemic-induced restrictions. Of those job postings, the top demanded occupations in both construction and manufacturing show themes of management and technology. Figure 12 shows the top occupations in each area. While the volume of job postings may be lower than expected, skill and labor demand trends in construction and manufacturing we saw in 2020 are likely to continue.

Of those roles in high demand, many command a strong salary. Figure 13 shows the average advertised salary for high-demand roles in the United Kingdom. Notably, Data / Data Mining Analysts rival top-earning management level occupations in terms of salary. Skills in high demand mirror the top roles – management and data skills are dominant across jobs. Of the non-software skills in highest demand, project management is the most prominent skill

Figure 13: Top Roles in Construction and Manufacturing in the United Kingdom



Source: Emsi Burning Glass 2021

Methodological Note: Occupations may fall in both Construction and Manufacturing. See the appendix for details.

Figure 14: Average Advertised Salary of Top Occupations in the United Kingdom

Figure 15: Top Specialized Skills in the United Kingdom

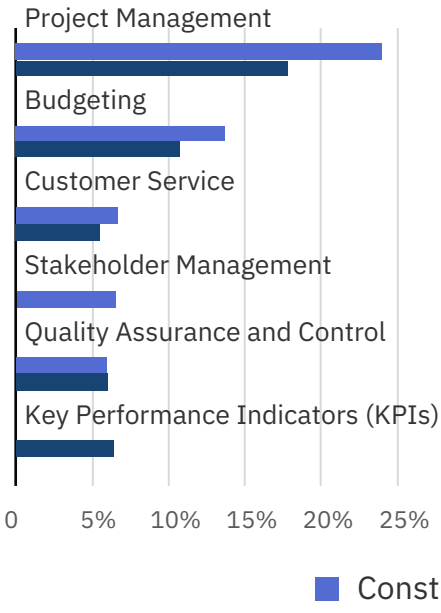
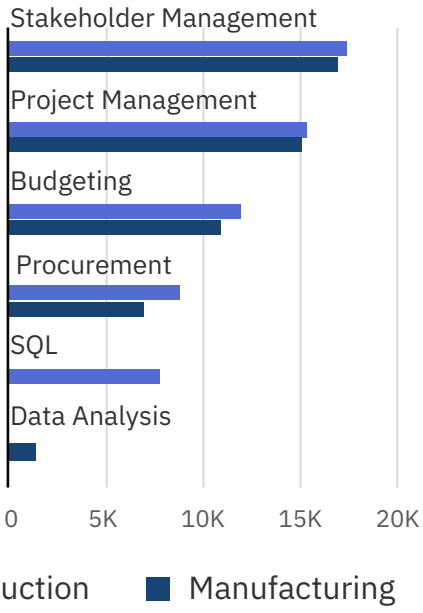


Figure 16: Skills Commanding the Highest Salary Premiums in the United Kingdom



Source: Emsi Burning Glass, 2021

in both construction and manufacturing jobs, with 24% and 17.8% of postings in 2020 requesting these skills, respectively.

In order to command higher salaries, workers may need command of specific skills, and in manufacturing and construction, these skills often revolve around management and data. Possessing knowledge and capability of specific skills can increase a worker's salary, often by a significant amount. Salary premium is calculated as the difference by occupation in the advertised salary of positions that request a certain skill and the average salary of all postings for that occupation. An increased salary premium is often an indication that the skill is difficult to hire for, and likely costly to train existing workers for.

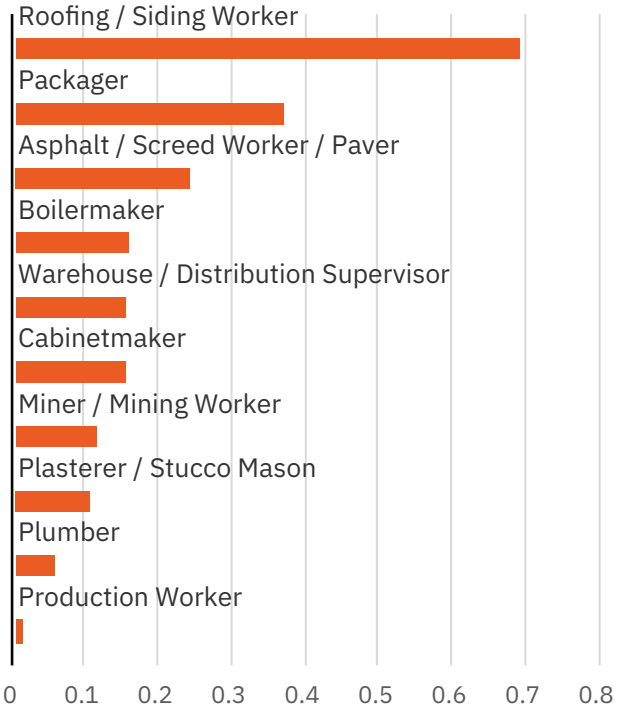
At present, the vast majority of construction

and manufacturing job postings in the United Kingdom do not list educational requirements for applicants, suggesting that it is in fact the skills and competencies that are most important. Without these formal education requirements, there is an opportunity for certification and educational programs to step in and provide training to ensure workers are competitive for these positions. This echoes what is seen in the United States in the past five years.

A Look at the Future

In the next five years, many manufacturing and construction-related occupations are poised to grow in the United Kingdom. To understand how occupations are likely to change in the near future, we can look at recent changes in demand. The occupation with the largest two-year historic growth rate is a Roofing / Siding Worker, with demand for such workers growing over 68% in the past two years.

Figure 17: Two Year Historic Growth Rates in the United Kingdom



Source: Emsi Burning Glass 2021

While data limitations preclude identifying disruptive skills specific to the United Kingdom, those identified for the United States likely ring true across the Atlantic. So too does the analysis of occupations at risk of automation and the career pathways that workers can take to adjust for this risk.

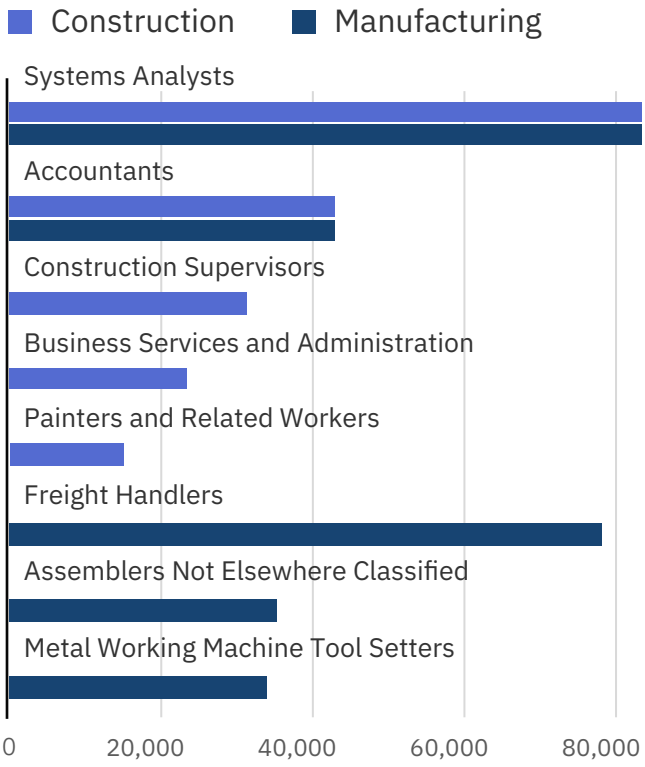
Chapter 3

Germany

The Roles of Today

Within Germany, we find 558,656 job postings across 45 unique occupations and 38 unique industries within construction and manufacturing in 2020. Because of the pandemic, these levels are likely to be lower than when the world is less restricted economically. In Germany, the roles experiencing the highest demand in 2020 are varied, though Systems Analysts and Accountants are amongst the most in-demand.

Figure 18: Top Roles in Construction and Manufacturing in Germany



Source: Emsi Burning Glass 2021

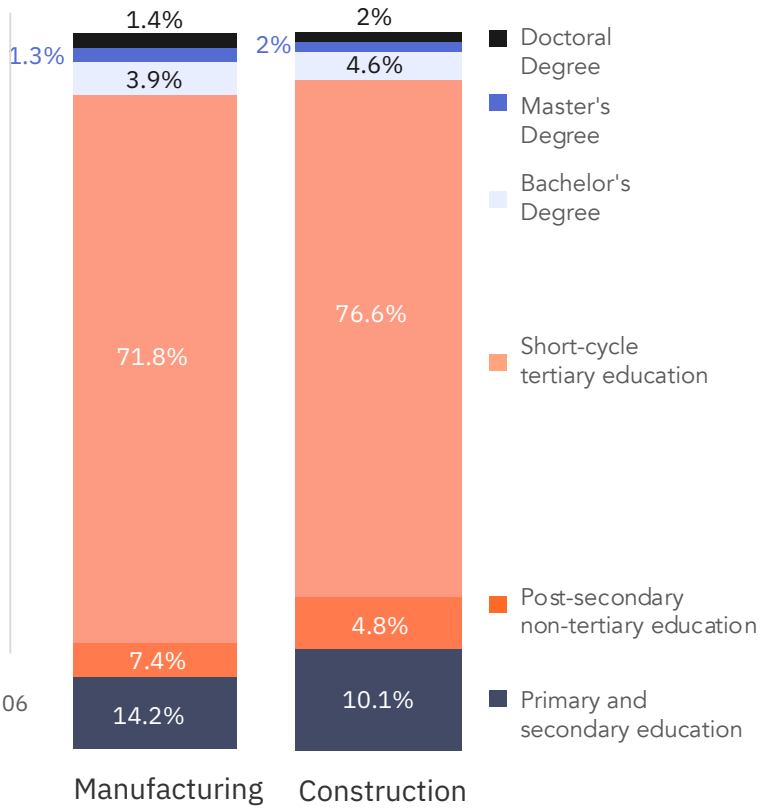
Methodological Note: Occupations may fall in both Construction and Manufacturing. See the appendix for details.

Across occupations, a number of software skills rise to the top as the most in-demand. From those, a few themes emerge. Programming skills for various purposes are sought after, as are more management-focused skills. All of these skills are such that they could be learned both in a formal education setting as well as a more loosely defined training program.

Figure 19: Top-Requested Software Skills in Germany

Source: Emsi Burning Glass, 2021

Figure 20: Education Requirements by Role



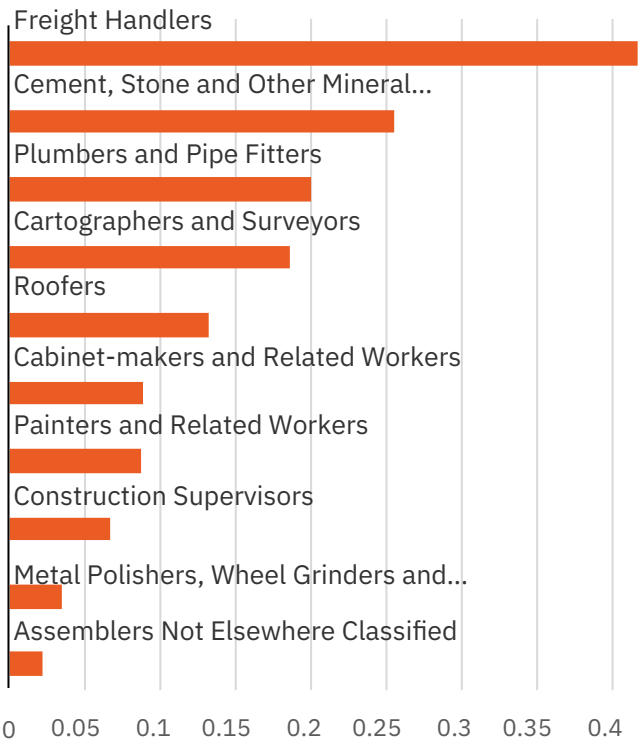
Source: Emsi Burning Glass 2021

Notably and unlike the US and UK, there are no postings within the German data set that omit an education requirement. That said, there are strong trends amongst educational requirements across jobs. Most of the construction and manufacturing jobs in Germany require short-cycle tertiary education of their applicants. This focus on sub-bachelor's degree workers dovetails with the lack of educational requirements found in the United States and the United Kingdom – suggesting that skills are critical, and a formal bachelor's degree is less important.

There may be skills, especially software and technical skills, that are not taught at this educational level, or skills learned may have become outdated. This is an opportunity for a training program to upskill and reskill workers to ensure they are well-positioned for the future.

To identify the roles likely to grow in the near future, we can look to the two-year historic growth rates of occupations in Germany. A notable front runner is the occupation of Freight Handler. Given the stresses placed on supply chains by the COVID-19 pandemic, the strong increase in demand is understandable. Outside of Freight Handlers, many other occupations experiencing strong demand in recent years are specialized construction workers, such as roofers, plumbers, and construction supervisors. While these occupations may seem unlikely to be affected by technological change and skills, that is not the case. These occupations demand increasing numbers of software skills.

Figure 21: Two-Year Historic Growth Rates in Germany



Source: Emsi Burning Glass 2021

Conclusion

As the global economy and the national economies of Germany, the United Kingdom, and the United States experience changes in construction and manufacturing jobs, it is important to understand the roles and skills of today, as well as the best ways for workers to prepare for the in-demand roles and skills of the future.

All three of the geographies studied point towards the rising importance of skills, and the declining importance of specified levels of education, across construction and manufacturing. This suggests that it may be skills and competencies that are of paramount importance and indicates that shorter college courses or on-the-job training programs may be well designed to empower workers with these skills. Training future workers, upskilling current workers, and identifying how skills can bring stability to those at risk of disruption due to automation offers a trifecta of opportunities for those in construction and manufacturing.

As workers face changes brought about by globalization and automation, it is important to think about how their current skills can be utilized to move them into another successful career. To this end, the analysis of career pathways for workers who are in occupations at risk of automation provides suggestions for skills and education that might allow for these workers to transition in the most seamless way possible to a new occupation at lower risk and with a higher compensation level.

It is always important for workers to be constantly increasing their human capital, through formal education, certifications, and general skill and experience acquisition. Automation, globalization, and technological change all make these even more critical. To that end, training opportunities abound in manufacturing and construction.

The contents of this report should serve as a benchmark for both employers and workers, and as a roadmap for potential paths forward for both parties, such that they all may prosper.

Appendix

Definition of Construction and Manufacturing Jobs

Job Catagory: ■ Construction ● Manufacturing ▲ All

- ■ Asphalt / Screed Worker / Paver
- ● Boilermaker
- ■ Brick / Stone Mason
- ■ Cabinetmaker
- ■ Carpenter
- ● CNC Operator
- ● CNC Programmer
- ■ Construction / Building Inspector
- ■ Construction Foreman
- ■ Construction Helper / Worker
- ■ Construction Manager
- ▲ Data / Data Mining Analyst
- ■ Drywall Installer / Finisher
- ▲ Estimator
- ● Etcher / Engraver
- ● Finisher / Polisher / Buffer
- ● Grinder / Sharpener
- ■ Insulation Worker
- ● Iron / Steel Worker
- ▲ IT Project Manager
- ● Laborer / Warehouse Worker
- ● Landfill Gas Technician
- ▲ Logistician / Supply Chain Specialist
- ▲ Logistics / Supply Chain Analyst
- ● Machinist
- ● Manufacturing / Production Technician
- ● Manufacturing Engineer

Job Catagory: ■ Construction ● Manufacturing ▲ All

- ● Manufacturing Machine Operator
- ● Miner / Mining Worker
- ● Molding / Casting Worker
- ● Non-Destructive Testing Specialist
- ● Oil / Gas Field Service Technician
- ● Oilfield / Rig Worker
- ▲ Operations and Maintenance Specialist
- ● Packager
- ■ Painter
- ● Physical / Geoscience Technician
- ● Pipe Fitter
- ● Pipeline Worker / Operator
- ● Plant Operator
- ■ Plasterer / Stucco Mason
- ■ Plumber
- ● Power Distributor / Plant Operator
- ● Production Plant Manager
- ● Production Supervisor
- ● Production Worker
- ▲ Program Manager
- ▲ Project Manager
- ▲ Public Administrator
- ● Pump Worker / Operator
- ▲ Quality Control Analyst
- ▲ Quality Control Systems Manager
- ▲ Quality Inspector / Technician
- ● Recycling / Sanitation Worker
- ● Rigger
- ■ Roofing / Siding Worker
- ● Sewing Machine Operator
- ● Sheet Metal Fabricator / Mechanic
- ● Solar Installer
- ▲ Supply Chain / Logistics Manager
- ● Surveying / Mapping Technician
- ● Surveyor
- ● Test Technician

Job Catagory: ■ Construction ● Manufacturing ▲ All

- Tool and Die Maker
- Transportation Supervisor
- Warehouse / Distribution Supervisor
- Water Treatment Specialist / Waste Water Operator
- Weatherization Installer
- Welder / Solderer

All postings in the industries of

Construction; Manufacturing; Professional, Scientific and Technical Services; and Health Care and Social Assistance are considered.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