

2019 MINNESOTA HIRING DIFFICULTIES SURVEY RESEARCH REPORT

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EXECUTIVE SUMMARY

This study examines employers' hiring experiences in 14 skilled production-related occupations in Manufacturing firms in Minnesota during 2018 through 2019. These occupations were chosen because of anecdotal evidence of shortages in these fields and growing numbers of vacancies. In-depth interviews with 146 Minnesota employers about over 1,000 job vacancies were conducted and analyzed for this study.

While employers reported general hiring difficulties for 62 percent of vacancies, just 10 percent of all vacancies were hard to fill solely because of lack of adequate supply (i.e. skills mismatches). Hiring difficulties were most frequently the result of a mix of supply- and demand-side problems. Hiring difficulties were most commonly found in:

- Occupations requiring long-term on-the-job training (OJT), especially machining and CNC programmers
- Industries that are low-tech, such as metal and food manufacturing
- Firms located in Central Minnesota
- Firms that do not provide structured OJT or apprenticeships
- Vacancies requiring a vocational certificate or Associate's degree
- Vacancies in positions affected by turnover
- Vacancies that do not offer benefits such as paid time off, health care, and retirement

When employers were given the opportunity to identify the reasons for their hiring difficulties we found that skills gaps are one of several underlying causes. Employers identified the following causes of hiring difficulties as additional explanations for skills gaps: undesirable shifts, uncompetitive wages or compensation, inconvenient firm location, ineffective advertising, lack of work ethic in candidates, and general disinterest in production work (an "image problem"). The correct identification of these barriers is essential to making these jobs more attractive to job seekers, especially high school students.

When skills gaps were cited as a problem, employers pointed out that the most critical skills are more effectively acquired through OJT than through formal post-secondary credentials. The correct identification of these skills is critical to crafting effective policy and education responses to ensure that workforce skills align properly with employers' needs.

By far the biggest skills gap identified by employers in job applicants is general mechanical aptitude, sometimes as basic as the ability to use hand tools such as a drill or a screwdriver. Respondents characterized this gap as generational. Math knowledge was also mentioned as lacking in candidates, from basic math to trigonometry and algebra. Strengthening math instruction and adding vocational courses at the high school level could help develop these skills and expose students to manufacturing careers.

Most employers understand that they have the ability to significantly reduce recruiting challenges. They understand that, in a tight labor market, each aspect of the job can become a competitive factor in the talent race, and firms that do not do enough to improve wage offers and workplace policies, or to highlight their advantages, might draw fewer applicants.

Most employers also understand that OJT is an essential component of any response aimed at alleviating hiring difficulties in skilled production jobs. Increased collaboration between employers and high schools/technical colleges is also essential. The most effective collaborations include offering students internships and work-based learning opportunities tailored to the unique needs of a region and industry. Whenever possible, the partnership should involve updating the curriculum with industry-approved competency standards in order to improve the alignment between school offerings and employer needs.

Firms that do not implement these actions often wish they could but cite resource constraints and fear of employee poaching from competitors as barriers. Disincentives to employer-provided training risks causing an overall decline in workforce skills across the manufacturing sector, especially as more experienced workers retire before their knowledge can be transferred to new generations.

Providing a combination of internal and external training to new hires and current employees is increasingly recognized as a best practice for bridging talent shortages. Initiatives by state agencies, such as the Minnesota Apprenticeship Initiative (Department of Employment and Economic Development and Department of Labor and Industry) and the Pipeline Program (Department of Labor and Industry) are drawing considerable interest from employers because they specifically address some of the toughest barriers and disincentives employers face.

STUDY DESIGN

The Minnesota Department of Employment and Economic Development, Labor Market Information Office (DEED-LMI) conducts the Minnesota Job Vacancy Survey (JVS) of employers in the second and fourth quarters of each year. The JVS is a mail survey which asks a representative sample of Minnesota employers to provide information about their current job vacancies. Based on responses, DEED-LMI is able to construct reliable estimates of the number of job vacancies for the specific time period and region, by occupation, industry, and other variables¹.

JVS is particularly well suited to investigate the issue of skills gaps because lacking workers' qualifications—when they exist— become especially problematic during the hiring process.

This study leverages Spring 2018 Minnesota Job Vacancy Survey results. A subset of reported vacancies was selected for further study based on anecdotal evidence of shortages in production occupations. The 14 occupations surveyed are listed below:

Mechanical Drafters (SOC 17-3013)

Electrical and Electronics Engineering Technicians (SOC 17-3023)

Electro-Mechanical Technicians (SOC 17-3024)

Industrial Engineering Technicians (SOC 17-3026)

Mechanical Engineering Technicians (SOC 17-3027)

Industrial Machinery Mechanics (SOC 49-9041)

Maintenance Workers Machinery (SOC 49-9043)

First-Line Supervisors of Production and Operating Workers (SOC 51-1011)

Computer-Controlled Machine Tool Operators (SOC 51-4011)

Computer Numerically Controlled Machine Tool Programmers (SOC 51-4012)

Machinists (SOC 51-4041)

Tool and Die Makers (SOC 51-4111)

Welders, Cutters, Solderers and Brazers (SOC 51-4121)

Inspectors, Testers, Sorters, Samplers and Weighers (SOC 51-9061)

For all selected vacancies, the research team made follow-up phone calls to employers to ask about their experiences filling these vacancies. In total, 146 establishments out of the 217 sampled responded to the follow-up survey, representing a 67 percent response rate and about 1,072 estimated vacancies. All the data cited in the report, including all graphs and tables, are from the 2019 Minnesota Hiring Difficulties Survey.

¹ Comprehensive information about the JVS methodology is available at <https://mn.gov/deed/data/data-tools/job-vacancy/jvs-methodology.jsp>

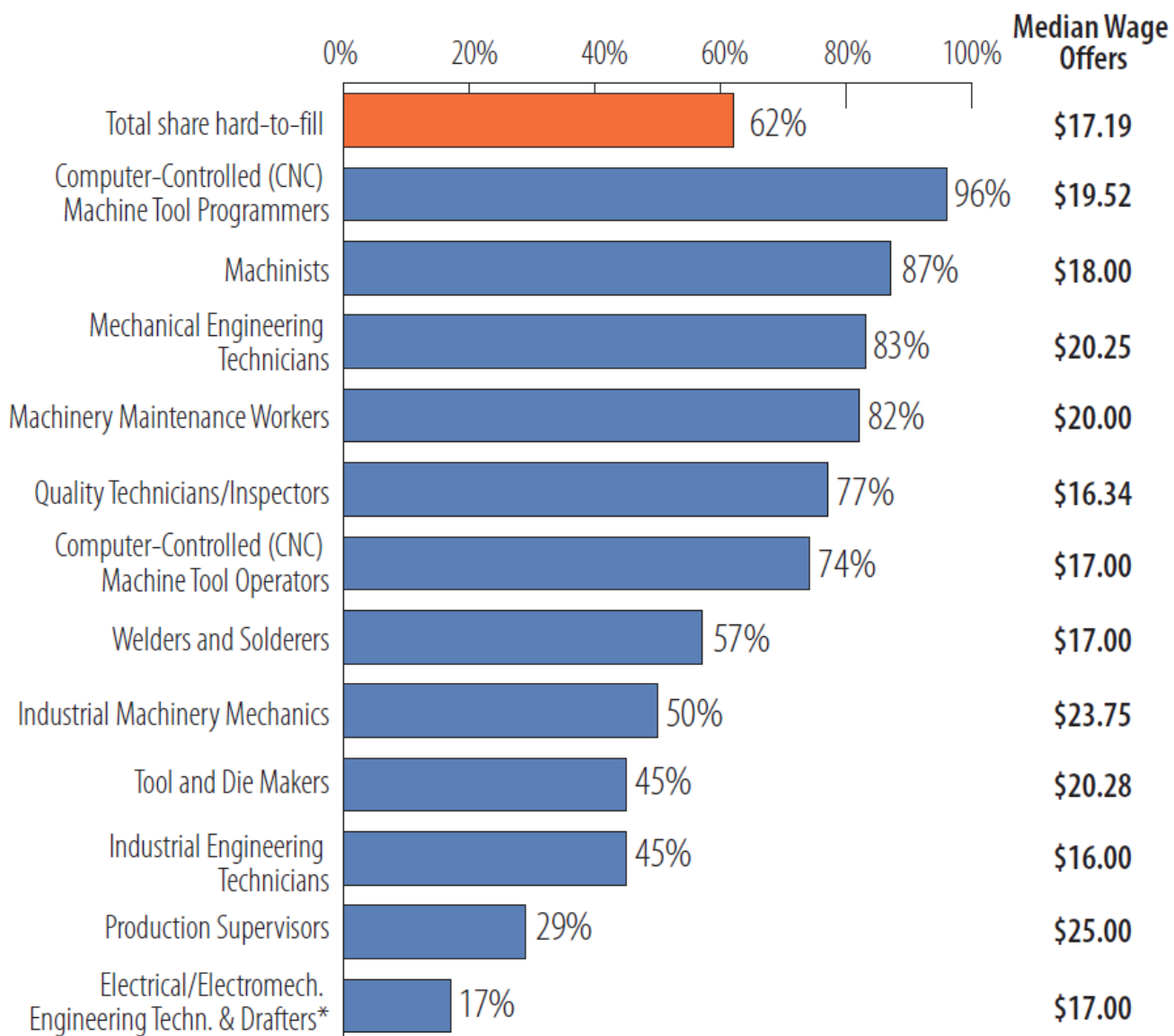
RESULTS

SECTION 1: HOW PREVALENT ARE HIRING DIFFICULTIES IN MINNESOTA?

Overview of Hiring Difficulties in Minnesota

Results from the Hiring Difficulties Survey indicate that 62 percent of job vacancies in skilled production occupations posted by manufacturing firms in 2018 were difficult to fill. Hiring difficulties varied widely by occupation. CNC Machine Tool Programmers had the highest incidence, at 96 percent, and Electrical/Electromechanical Engineering Technicians and Drafters had the lowest incidence, at 17 percent (Figure 1). The chart also shows median wage offers by occupation. These wages refer to 2018, and we heard from respondents that they have increased since then.

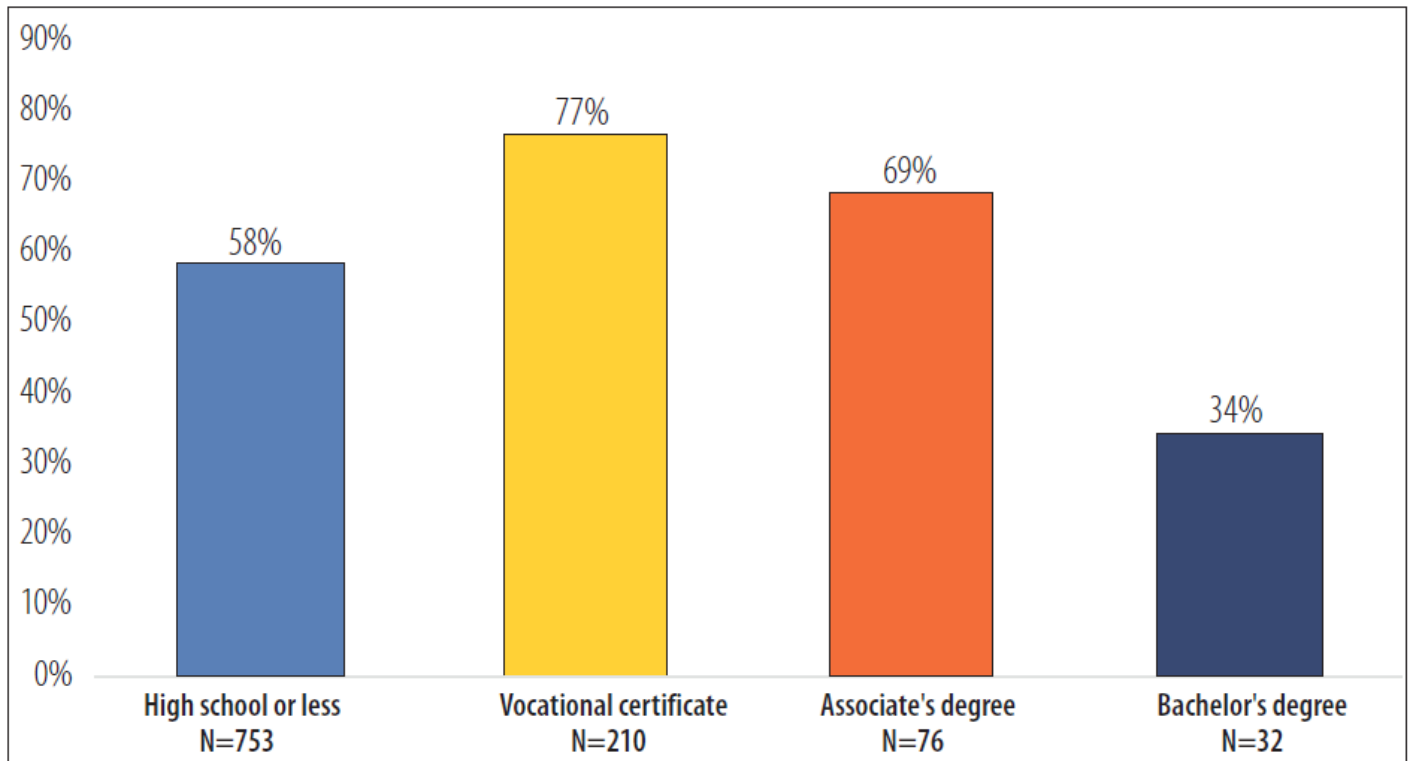
Figure 1. Share Hard-to-fill Vacancies by Occupation



*This group combines the following occupations: SOC 173013 Mechanical Drafters; SOC 173023 Electrical and Electronics Engineering Technicians; SOC 173024 Electro-Mechanical Technicians.

Seventy percent of the estimated vacancies in skilled production required only a high school diploma. Of these, 58 percent were difficult to fill, representing the largest pool of hard-to-fill vacancies in terms of sheer size (Figure 2). In terms of concentration, however, vacancies requiring a vocational certificate had the highest incidence of hiring difficulties at 77 percent. Vacancies requiring a four-year degree were both the smallest group and the least likely to be hard to fill (34 percent). These results show that, in general, the educational requirements of these jobs, alone, are not driving hiring difficulties.

Figure 2: Percent Hard-to-fill Vacancies by Education Requirement



All surveyed occupations with hiring difficulties of 50 percent and above need considerable on-the-job training, with the only exception being Mechanical Engineering Technicians that require an Associate's degree and no OJT (see Table 1).

Table 1- Training and On-the-job Training Requirements by Occupation, Rank-ordered by Difficulty Hiring

Percent hard to fill	soc code	Occupation title	Most common training required in the occupation (1)	Most typical OJT needed to attain competency in the occupation (1)
96%	514012	Computer Numerically Controlled (CNC) Machine Tool Programmers	Postsecondary non-degree award	Long-term OJT
87%	514041	Machinists	Postsecondary non-degree award	Long-term OJT
83%	173027	Mechanical Engineering Technicians	Associate's degree	None
82%	499043	Maintenance Workers Machinery	High school diploma or equivalent	Moderate-term OJT
77%	519061	Quality technicians/Inspectors	High school diploma or equivalent	Moderate-term OJT
72%	514011	Computer-Controlled Machine Tool Operators	High school diploma or equivalent	Moderate-term OJT
57%	514121	Welders and Solderers	High school diploma or equivalent	Moderate-term OJT
50%	499041	Industrial Machinery Mechanics	Postsecondary non-degree award	Long-term OJT
45%	173026	Industrial Engineering Technicians	Associate's degree	None
45%	514111	Tool and Die Makers	Postsecondary non-degree award	Long-term OJT
29%	511011	First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	None
17%	173013/ 173023/ 173024	Electrical/Electromechanical Engineering Technicians and Drafters	Associate's degree	None

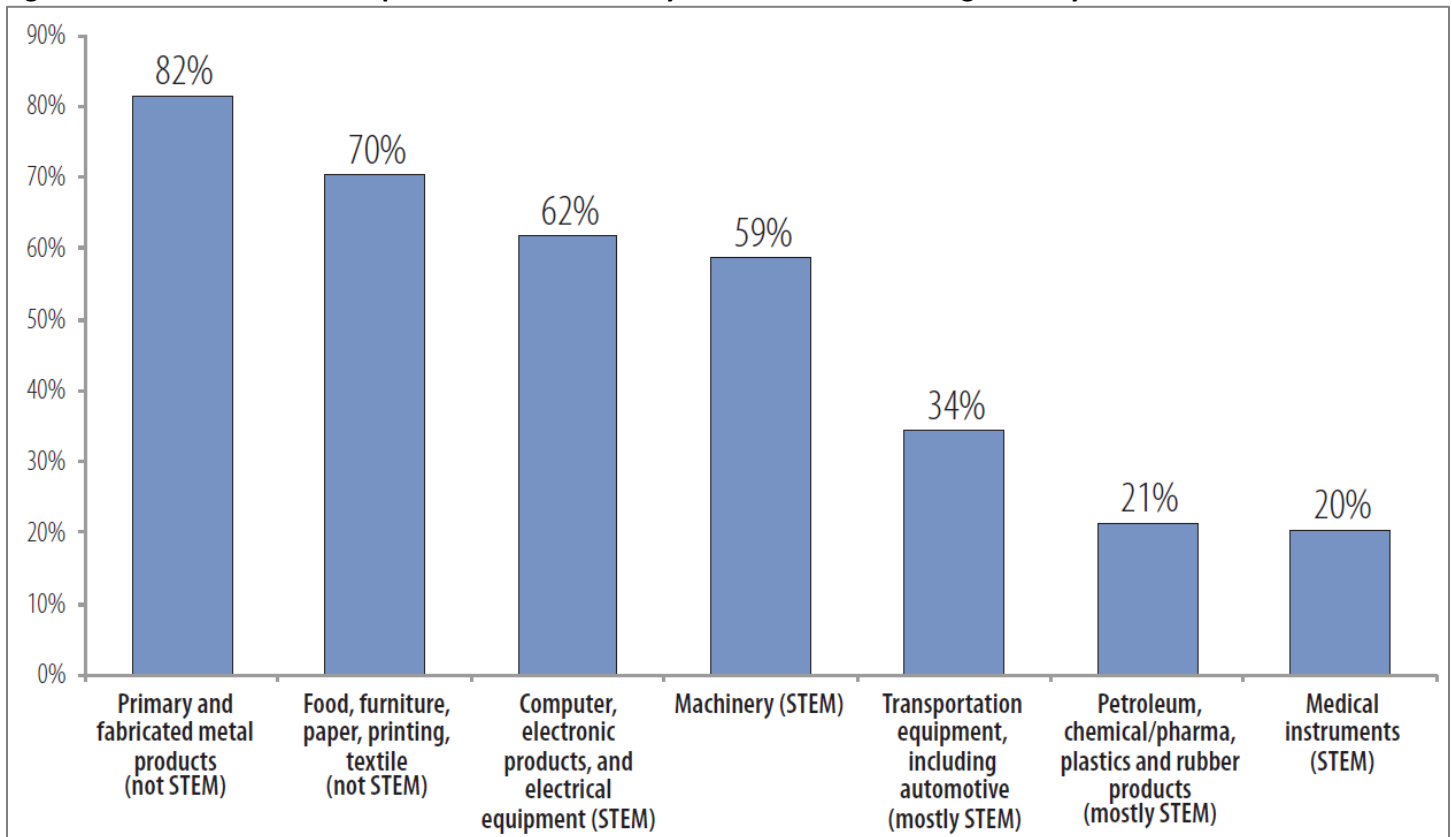
(1) Source: Bureau of Labor Statistics Education and Training measures <https://www.bls.gov/emp/tables/education-and-training-by-occupation.htm>. In the case of Machinists, education requirements are higher than those set by the BLS because DEED research has identified higher educational standards in Minnesota.

Full competency in Machining, CNC Machining/Operator, Welding and Machinery Maintenance is acquired through OJT lasting from one month to many years. This suggests that in the current labor market, hiring for skills that can only be built through years on the job is much harder than hiring for skills that can be built in the classroom.

Hiring difficulties also varied considerably by industry (see Figure 3). One possible factor driving these differences is the technological intensity, or STEM-relatedness, of the industry². Non-STEM industries appear more prone to hiring difficulties, especially primary and fabricated metal products (81 percent hard to fill) and food, printing, and textile products manufacturing (70 percent hard to fill). In contrast, STEM sectors are less likely to experience hiring difficulties.

² The Bureau of Labor Statistics (BLS) defines high-tech industries as those having high concentrations of workers in science, technology, engineering, and mathematics (STEM) occupations. Our definition also includes industries with a high level of spending in research and development.

Figure 3: Share of Vacancies Reported Difficult to Fill by Detailed Manufacturing Industry



These overall findings about the magnitude and distribution of hiring difficulties serve as a background to the next section of the article that takes a closer look at the nature and potential causes of hiring difficulties and, specifically, at the incidence of skills gaps.

SECTION 2: EMPLOYERS PERCEPTIONS OF HIRING DIFFICULTIES AND THE ROLE OF SKILLS GAPS

If too few applicants have the skills, knowledge, or experience to qualify for the position then we can say that there is a gap, or mismatch, between workers' skills (supply) and the skills needed to perform the job (demand). On the other hand, it is important to realize that there are a variety of reasons an employer may have hiring difficulties, and that many of these have little to do with the available supply. Characteristics of the firm and/or the job itself could reduce the likelihood that candidates will choose to apply for or accept a position. Some of the most basic demand-side factors include the wage offered, the hours of work, and the location of the work.

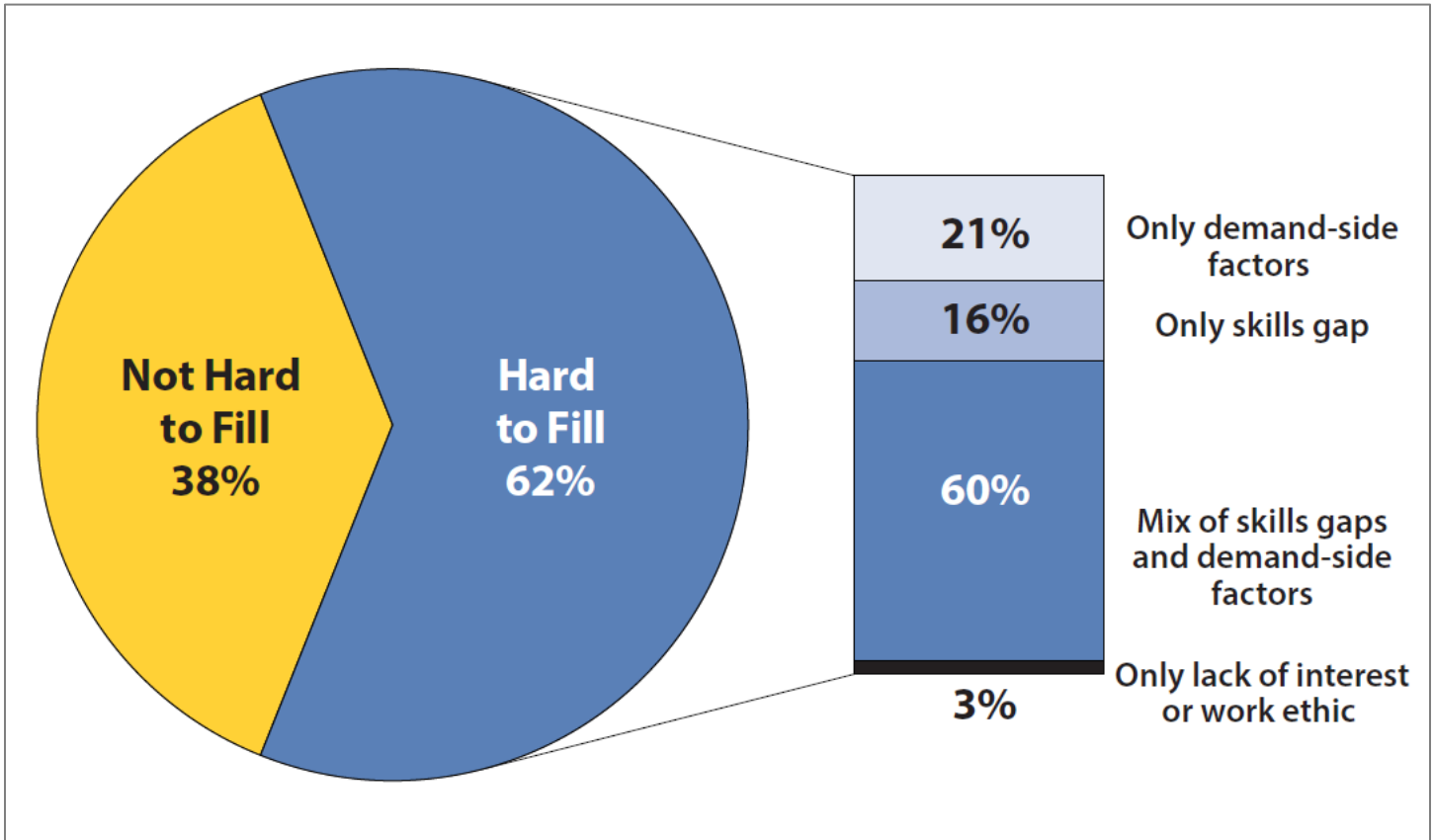
To determine how many cases of hiring difficulties are specifically attributable to skills mismatches employers were asked to identify the reasons for their difficulties by choosing either:

1. Hiring difficulties caused by a mismatch between job requirements and the training, skills, and/or experience of applicants (**skills gaps**); or
2. Hiring difficulties caused by problems related to job or firm characteristics such as unattractive work hours, wages, geographic location, ineffective recruiting, and so forth (**demand-side factors**).

Figure 4 summarizes employers' responses. Of the 62 percent of vacancies that were hard to fill, one-fourth (21 percent) were attributed exclusively to undesirable job characteristics or ineffective advertising strategies (demand-side factors), while 16 percent were attributed exclusively to a lack of skills, experience, or credentials in candidates (skills gaps). Sixty percent of hiring difficulties were perceived by employers as being caused by a mix of skills gaps and demand-side

factors. The remaining 3 percent was attributed primarily to applicants' lack of work ethic or lack of interest for a career in manufacturing.

Figure 4: Factors Perceived by Employers as Contributing to Hiring Difficulties



Pure skills mismatches—difficulties where employers did not also identify a demand-side problem—account for merely one sixth of all hiring difficulties, or about 10 percent of all vacancies in skilled production occupations.

When demand-side factors were cited as a problem, inconvenient shifts and uncompetitive wages were the biggest barrier, affecting 49% and 40% of responses respectively, followed by location and ineffective advertising. The following quotes from respondents illustrate these points:

“If I had first shift spots open I’d be able to fill those.”

“Our proximity to the MPS metro area causes us to lose some applicants because we can’t afford to pay what they are probably getting in the cities.”

“When we find a person who is qualified we will hire them the next day. But these people have gone to competitors and they will take the best offer at other manufacturers. Maybe we aren’t the best offer. Maybe others offer more perks, closer to where they live, maybe a different shift, maybe hours that are more flexible, maybe they don’t like the start time and the end time so they can take the kids to school in the morning and then come to work.”

“We are in Eden Prairie. There is limited public transportation Monday through Friday and none on the weekends, and we are trying to hire a night shift and weekend shift.”

“We cannot compete with employers next to us because they pay higher wages. Therefore we pull our people west of here which is a lower paying area, but with less experienced people. Furthermore, the work environment in our facility is

not desirable because it is not air conditioned, not in a clean room, and workers need to stand. And the shift is 6 a.m. to 4:30 p.m.”

“All we use is MinnesotaWorks and several temp agencies. We don't have active headhunters or recruiters. There is quite a bit that could be done to advertise, but we aren't doing. We are a relatively small company.”

It is important to note that many factories operate around the clock to make the most use of expensive machinery. Although most employers offer a pay differential for evening and night shifts, it can still be hard to find people willing to work them. This can make it very difficult for manufacturers, especially those facing competition in the marketplace, to balance equipment optimization with employee satisfaction.

Another important job characteristic is the image of the industry. We heard from several employers that competition with other firms is often a matter of a high-tech image, although other factors besides technology might also play a role. Firms with a low-tech image sometimes struggle to compete with firms that are perceived as more high-tech, as illustrated in the following example:

“The non-food industry last year was booming in our region, and people wanted to do things not related to food. A lot of food mechanics went into engineering/cleanrooms and different job focus areas with the same skillsets/knowledge base, for example windfarms.”

When skills mismatches were cited as a problem, two main issues emerged: inadequate hands-on training on the job and lack of a post-secondary credential. We found some evidence of gaps in post-secondary training offerings, specifically in tool making and CNC machining³. These gaps in program offerings are a cause of concern for some employers especially in Greater Minnesota, as shown in the following quotes:

“In this area of Minnesota there is a shortage of qualified CNC Machinists. The position requires a 2 year technical degree and there are a limited number of technical schools in this area that offer the program.” (Northwest Minnesota)

“Very few candidates in NW Minnesota possess the desired skills, but can meet some of the minimum criteria. Technical education is preferred for this role, but nearly impossible to find.” (Northwest Minnesota)

“Toolmaking is not as common as it was 15 years ago when people were getting more education for that. And our local tech school is more for machinists. So maybe it's more a problem of our location relative to the schools that offer the program.” (Northwest Minnesota)

“Local colleges used to have a program for tool and die making, but not anymore because people are not interested.” (Southeast Minnesota)

Besides these limited cases of evident post-secondary training gaps, employers make it very clear that the skills they are looking for are groomed through years on the job. This means that, unless post-secondary training is tailored around the individual needs of businesses, lack of experience could still be a barrier to hiring even if candidates have good educational credentials. Below are some illustrative comments from respondents:

“The products we make require very high quality welding. It's not necessarily a certification or education, it is the quality of the weld they are able to perform that matters when we hire.”

“What most applicants went to school for isn't really going to apply. Their knowledge at a competitor makes more sense because our system is not a common software. They have to have some versatility of computer knowledge.”

³ DEED's Occupations in Demand tool shows demand for both occupations, but only two schools in the state offer a program in Tool and Die Making (https://apps.deed.state.mn.us/lmi/oid/CIP_SchoolDetail.aspx?id=514111&geog=2701000000) and no program for CNC Machining exists in Northwest Minnesota (https://apps.deed.state.mn.us/lmi/oid/CIP_SchoolDetail.aspx?id=514012&geog=2701000000).

“The quality control inspector job requires specialized experience more than any type of degree. The specialized experience is developed here as an operator. What we’d normally do is promote people from within, because we know they went through our blueprint reading training successfully. When we can’t hire from within we want external candidates to have a minimum of over a year of experience.”

“They are having to troubleshoot and do a lot of diagnostic work on these machines, and we have over 200 machines. It takes someone very well rounded to get the machines up and running in a timely manner. It also takes a very independent worker.”

“We have always offered on-the-job training because we know that candidates do not typically possess the skills needed to operate CNC equipment coming in. The only educational standard is a GED.”

The need to hire someone with prior work experience inevitably restricts the size of the candidate pool and creates fierce competition among manufacturers for candidates.

We also asked employers whether the *quantity* of the job applications received played any role in their hiring difficulties. This problem impacted 68 percent of hiring difficulties. The problem is so serious that in most of these cases employers received 10 applications or less. The problem was particularly acute in Greater Minnesota. The root causes are often traceable to lack of people interested in the work or a combination of skills gaps and undesirable job characteristics. In a tight labor market, each aspect of the job can become a competitive factor in the talent race. As a result, firms that do not do enough to sweeten their offers or to highlight their advantages might draw fewer applicants. Here are some examples respondents provided:

“The pool of qualified candidates goes down significantly when the position is a second or third or weekend shift.”
(Undesirable shifts are the main cause of low supply of qualified applicants.)

“We have 23 people retiring to every person that is entering the field. We're trying to partner with the local college and give them \$5,000 for every welder candidate who would be interested in working for us, but there isn't anybody.” (Lack of interest is the main cause of low supply of qualified applicants.)

“We brought in an outside agency to help us with some advertising and rebranding a campaign for us because last fall we saw a drop in applicants.” (Ineffective advertising strategy was likely the main cause of low supply of qualified applicants.)

“There are so many more opportunities out there, and the work here is a bit dirtier. Also, we were looking for candidates with mechanical aptitude.” (Undesirable work conditions and lack of mechanical aptitude were concurrent causes of low supply of applicants.)

“In this area of Minnesota there is a shortage of qualified CNC Machinists. The position requires a 2 year technical degree and there are a limited number of technical schools in this area that offer the program. Employers will often reach out to students early on in the program to offer them jobs at very competitive wages. We received only three applications.”
(Lack of applicants with the right type of degree/skills and uncompetitive wages relative to other employers were concurrent causes of low supply of applicants.)

“You almost can't hire for maintenance mechanics. You have to grow and train them within. They need to have experience with industrial manufacturing equipment, conveyors, motors, and controls. Because of the age of the people with these skills, they are going to age out of the workforce before we can replace them. More are aging out than coming into the field. Furthermore, the position we are trying to fill is the night shift, and we are located in a small community. We received only one application.” In this example, the location and the shift (factors related to demand) combined with the loss of experienced workers to retirements and lack of experience in younger applicants (factors

related to both quantity and quality of supply) were concurrent causes of the low number of applicants, which then made the job difficult to fill.

Examples like these show that skills gaps and demand factors are often interrelated, because qualified candidates might be unwilling to apply for jobs that are perceived as less rewarding than others available economy-wide. Therefore, augmenting the skill level of the workforce through post-secondary or work-based training is only part of the solution *in the absence of measures that also remove the barriers* that employers themselves recognize as disincentives to apply for their positions.

To further add to the complexity of the hiring difficulties phenomenon, 52 percent of employers agreed that their difficulties could be related to candidates' lack of work ethic or interest. The examples cited by respondents included lack of interest in the work, low attendance often due to unwillingness to work a late shift, failure to pass a background check, and excessively high wage expectations. The following quotes capture some of these heterogeneous factors:

"Younger people are not seeing manufacturing as a good industry to go into."

"When we have applicants they don't show up to the interview."

"We worked with several temporary agencies. It was like a revolving door: they show up one day and don't show up the next. Also, sometimes they fail the background check."

"It seems as though many candidates believe they deserve more before they earn or prove themselves. Many quit previous jobs because it wasn't enough money. Also, some absolutely are not open to a shift other than first shift."

In today's strong economy the supply of workers for production jobs has definitely not kept pace with demand. However, the evidence we just presented makes it clear that skills gaps as a cause of hiring difficulties cannot automatically be assumed to be the result of a shortage of skilled workers. The role of demand-side factors in determining people's decisions about what careers to pursue and which jobs to apply for must also be acknowledged if we want to solve the problem at its root.

SECTION 3: ANALYSIS OF FACTORS DRIVING HIRING DIFFICULTIES

The previous section looked at employer perceptions of the causes of hiring difficulties. In this section we analyze the impact of firm and job characteristics on hiring difficulties. In order to accurately isolate and measure the impact of these factors, we included them in a logistic regression model that predicts the probability of a vacancy being hard to fill. This quantitative analysis found measurable evidence of the influence of the following factors on hiring difficulties: occupation and industry sector (already documented in Figure 1 and 3), firm location, firm size, STEM-relatedness of the industry, education level, turnover, provision of employee benefits, and the firm's level of engagement in training its employees (see Table 2).

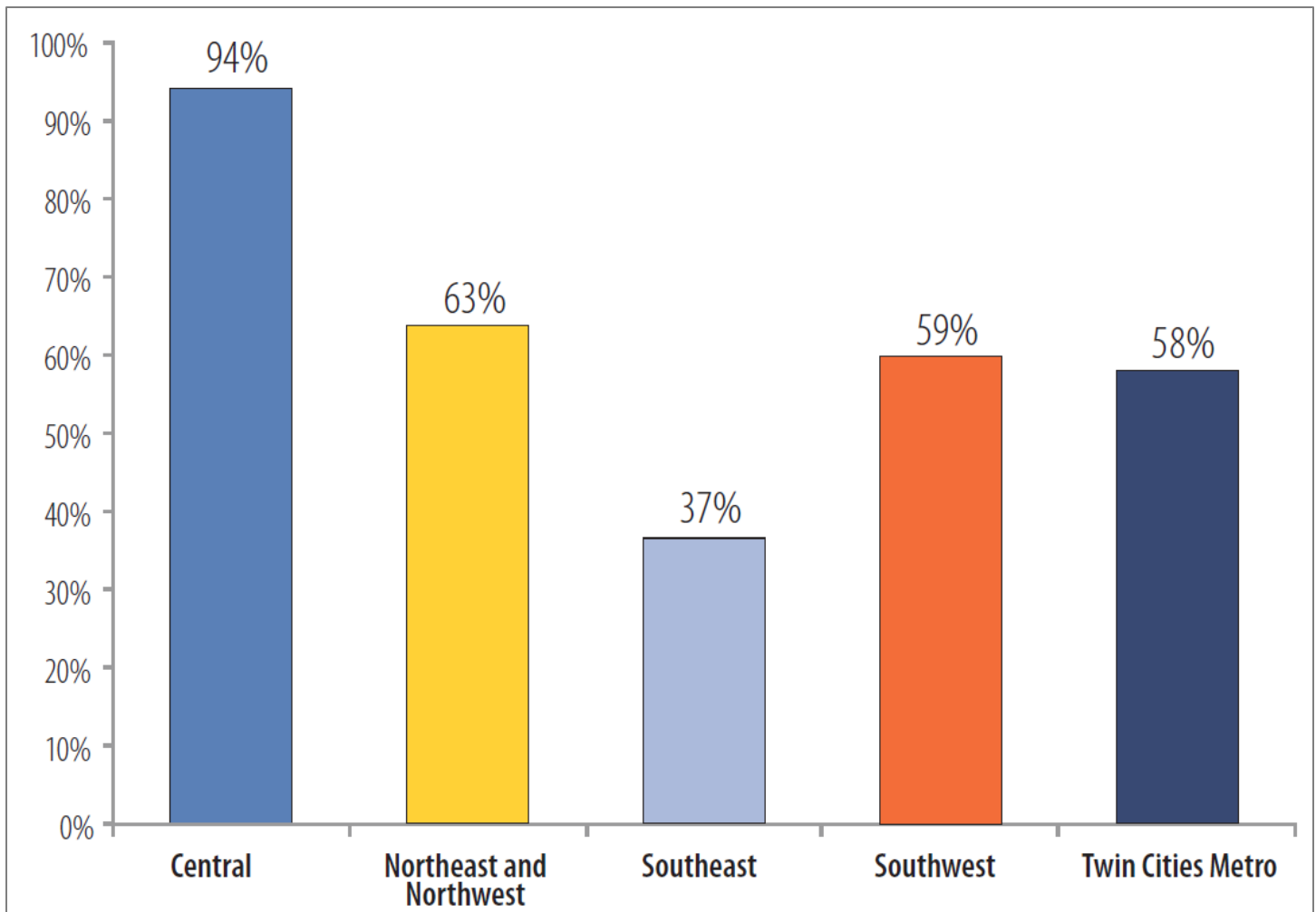
Table 2

Table 2- Comparison of Hard-to-Fill and Not-Hard-to-Fill Vacancies by Firm and Job Characteristics		
Factor	Categories	Percent Hard to Fill
Firm Location	Metro Area	58%
	Greater Minnesota	65%
Firm Size	Small: Less than 56 employees	71%
	Medium: 56-249 employees	61%
	Large: 250 or more employees	54%
Experience Requirements	No experience required	67%
	Experience of less than three years	60%
	More than three years of experience	61%
Education Requirements	High School diploma or less	58%
	Vocational certificate or Associate's degree	75%
	Bachelor's	34%
Training Indicator	Yes, the firm offered structured OJT or apprenticeship over the last 12 months	56%
	No, the firm did not offer structured OJT or apprenticeship	76%
Turnover Indicator	Yes, there was turnover in this position for reasons other than retirements	76%
	No, there was no turnover in this position except possibly because of retirements	34%
STEM-related Industry Indicator	Yes	45%
	No	73%
Position offers Retirement, Health Care, or PTO Benefits	Yes	61%
	No	78%
The logistic regression model was able to correctly predict the presence (or absence) of a hiring difficulty in 88 percent of cases, with a Nagelkerke R Square of .680. The full regression model, including power and direction of each variable, is shown in Appendix I.		

The logistic regression model had an R square of .680, indicating that the variables combined were able to explain 68 percent of cases of hiring difficulties. The factors most significantly associated with hiring difficulties are explained below.

Firm location: As shown in Figure 5, Central Minnesota – primarily urban and close to the Twin Cities - experienced significantly more hiring difficulties (95 percent) compared with rural Southwest Minnesota (59 percent). The explanation is probably that firms in Central Minnesota experience competition from both local and Twin Cities manufacturers.

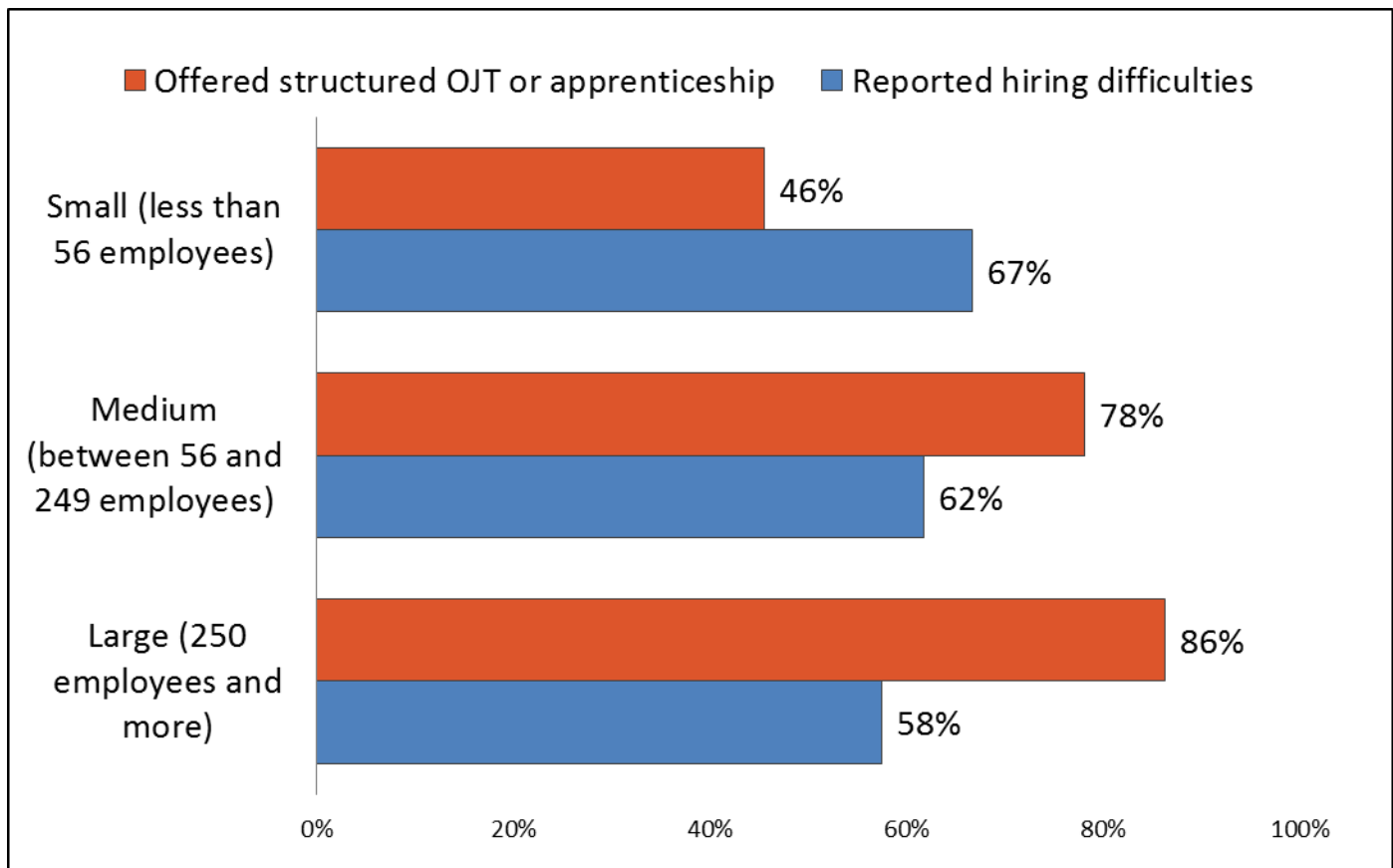
Figure 5: Share Hard-to-fill Vacancies by Region



Firm size: Vacancies were more likely to be hard-to-fill in small firms (fewer than 56 employees) compared with medium and large firms (56 employees and over).

Delivery of OJT: Seventy-six percent of firms that did not offer structured training had difficulties filling production vacancies compared with 56 percent that did offer training. A possible explanation is that firms that lack the capacity to deliver training to new hires also lack the flexibility to hire inexperienced candidates. Firm size and delivery of training are strongly interrelated, as shown in Figure 6. As firm size increases, the likelihood of delivering structured OJT increases while the incidence of hiring difficulties decreases. Small firms had an incidence of hiring difficulties of 71 percent but only 38 percent offered OJT or apprenticeships. The reason for this disparity is that the delivery of training often requires upfront costs and specialized staff whose job is to identify and prioritize internal skills needs. However, one of the key results of our analysis is that the significance of the OJT indicator persists even when all other factors shown in table 2 are controlled for, including firm size. Therefore, OJT emerges from this analysis as a potentially effective method to prevent hiring difficulties in a variety of contexts, including smaller-sized firms.

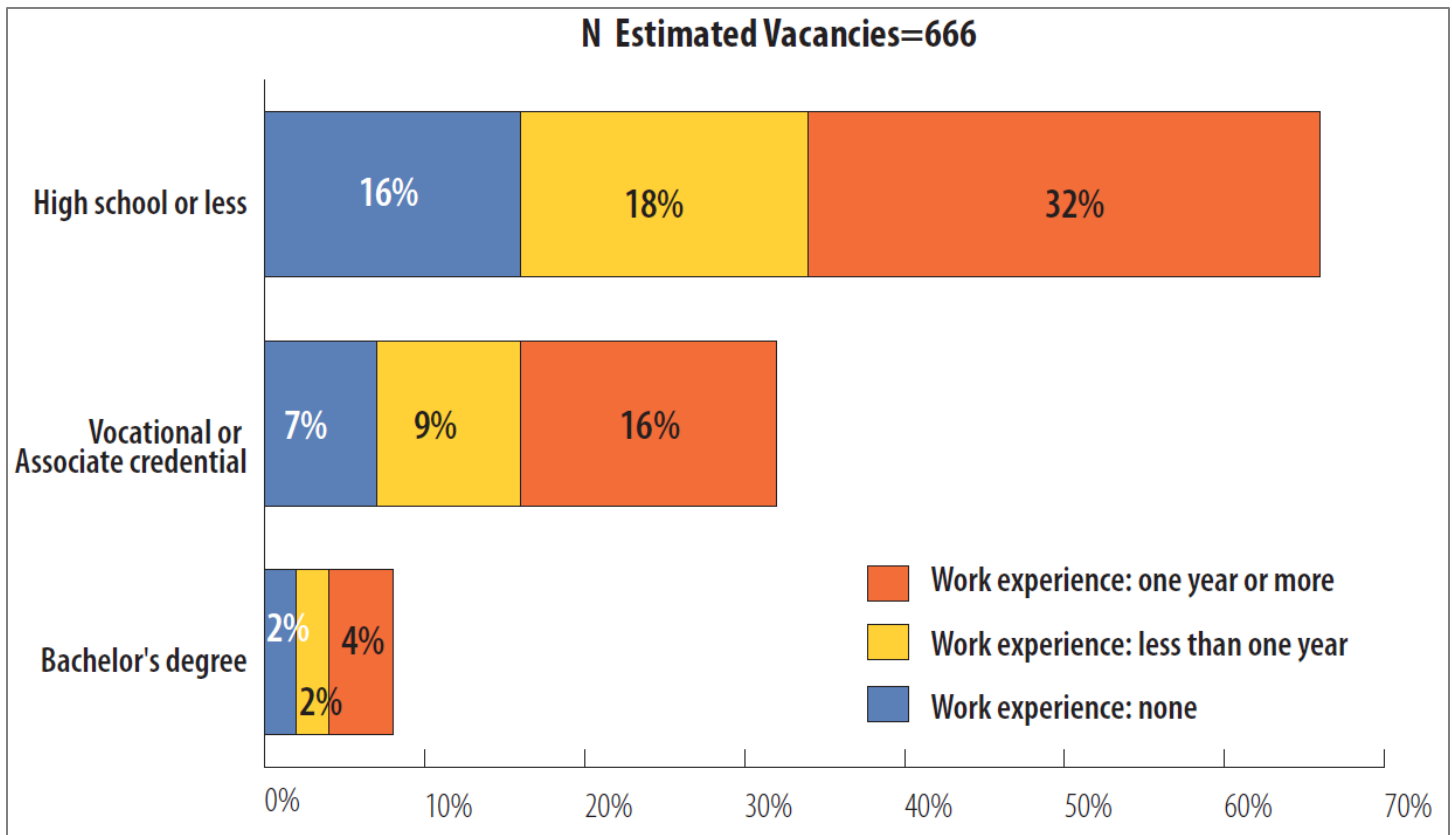
Figure 6: Relationship Between Hiring Difficulties and the Provision of OJT in Manufacturing, by Firm Size



Education and experience level: Hiring difficulties do not grow proportionally with the skill level of a position, but are instead concentrated in the middle of the skill range. Table 1 shows that hiring difficulties were more common in vacancies requiring a vocational certificate or associate degree (75 percent) followed by a high school diploma (58 percent). However, Figure 6 reveals that only 16 percent of hard-to-fill vacancies were truly entry-level, requiring no education and no experience. The largest group, 32 percent of hard-to-fill positions, needed more than one year of experience at a minimum. Employers seem to be responding to a tight labor market by lowering required education and substituting it with highly specific experience requirements⁴.

⁴ An analysis of job postings confirms that experience matters more than formal credentials. Job postings rarely specify what kind of post-secondary credentials is required or preferred, while spending great detail on describing required hands-on experience and skills.

Figure 7: Hard-to-fill Vacancies by Education and Experience Requirement



Expecting high-school educated external candidates to bring a mid-level skill set, typically developed through technical post-secondary schooling or specialized on-the-job training, clearly presents a challenge for employers.

STEM-related industry: The incidence of hiring difficulties was higher in industries with low concentrations of STEM workers, at 73 percent, than in industries with high concentrations, at 45 percent. Employers’ open-ended responses suggest that low-tech firms face competition from high-tech firms for talent, often for the simple reason that the “perceived coolness” of a product is a driver in deciding where to work. Despite the fact that many jobs in low-tech manufacturing have become just as technology-intensive as others in the industry, misconceptions can be hard to eradicate. Furthermore, this indicator probably captures differences in the physical comfort and safety of facilities. Employees in low-tech manufacturing might be exposed to uncomfortable temperatures, odors, dirt, inflammable or toxic substances depending on the industry.

Turnover: Three out of four (74 percent) vacancies in positions that had turnover were hard to fill, more than twice as high as among non-turnover vacancies at 34 percent. Turnover is very strongly associated with hiring difficulties even when all other factors in the model are held fixed. This could stem from the fact that firms that tend to have greater turnover need to do more hiring in general. Another explanation is that turnover and hiring difficulties share common causes. The most frequently cited causes of turnover are low compensation, uncomfortable working conditions, and inconvenient work shifts.

Benefits indicator: Vacancies that offered retirement, health care benefits, or paid time off were less difficult to fill than those that did not. Furthermore, all seasonal and temp positions were hard-to fill, clearly demonstrating that job quality characteristics are important recruiting tools especially in tight labor markets.

Finally, our quantitative analysis did not find any evidence of a statistically significant association between hiring difficulties and wages. A possible explanation for this result is that industry and employer characteristics - including

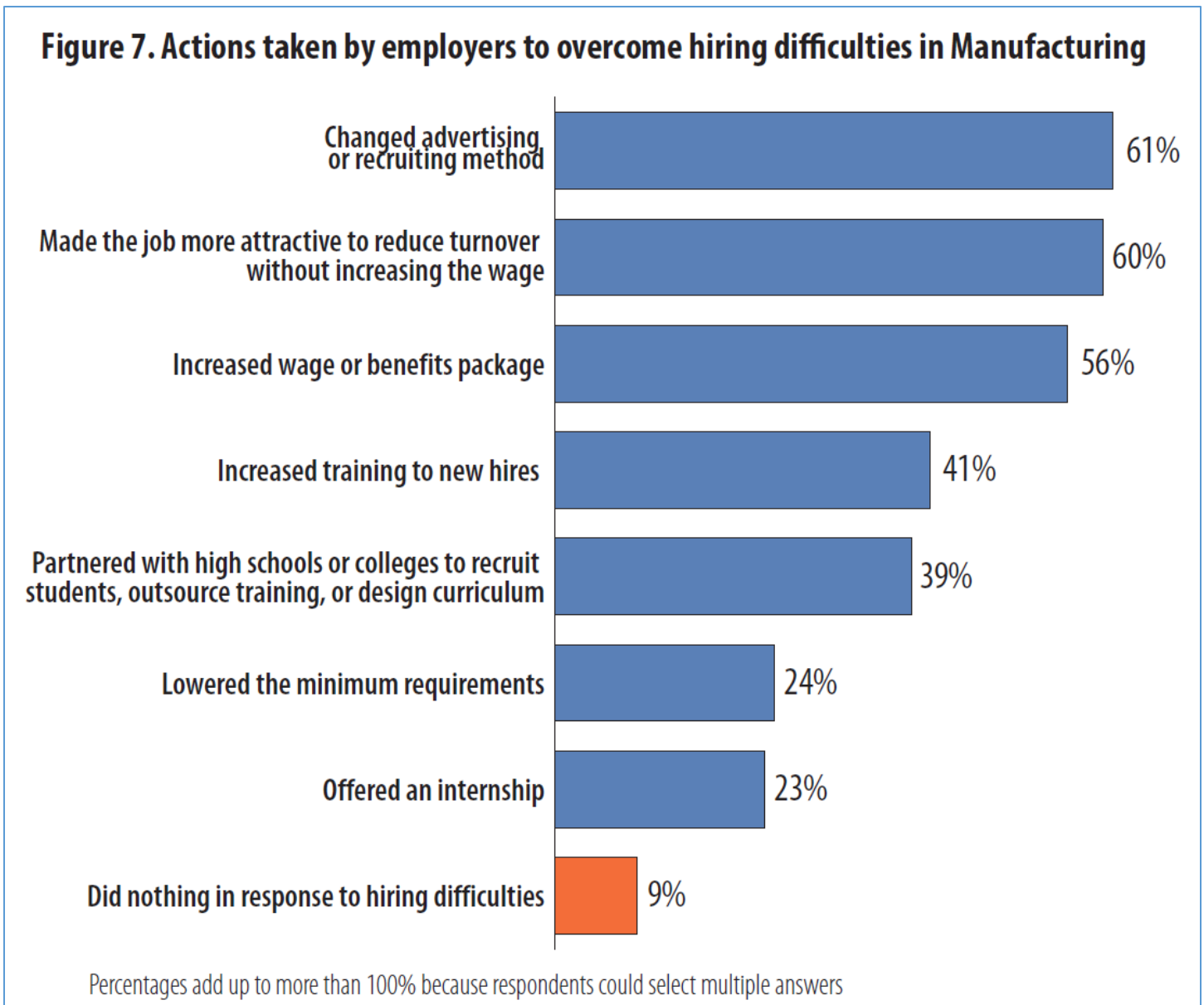
bonuses and the whole compensation package in addition to prospects for future wage growth - play a bigger role than starting wage offers.

In conclusion, we found measurable evidence of demand-side effects on hiring difficulties. In particular, the significance of turnover, benefits, and STEM-relatedness of an industry could indicate a causal relationship between undesirable job characteristics (demand-side factors) and recruiting problems. We also found a strong relationship between skills and hiring difficulties, demonstrating that skills gaps are present especially at the middle of the skills range. An equally important take-away from this analysis is that OJT is an essential component of any response aimed at alleviating hiring difficulties in skilled production jobs. Last but not least, the variation in hiring difficulties across education requirements, occupation, industry and geographic location shows that one size does not fit all. Workforce development practitioners and policymakers must develop targeted interventions.

SECTION 4: HOW EMPLOYERS ARE RESPONDING TO HIRING DIFFICULTIES

The practical steps taken by employers in response to hiring difficulties can tell us a great deal about what they believe to be the nature of their challenges and the most effective solutions. Figure 8 shows that the most popular strategy, adopted in 61 percent of cases, is changing advertising or recruiting methods. Employers who chose this response felt that traditional advertising through job banks is not effective at reaching people already employed or who would not naturally think of manufacturing as a career. Today's tight labor markets require more innovative and broad-reaching strategies, such as Facebook campaigns or making connections with schools to promote these careers and offer company internships.

Figure 8: Actions Taken by Employers to Overcome Hiring Difficulties



The second and third most popular strategies entail making the job more attractive with or without increasing the wage. The popularity of these responses is in itself a sign of employers’ awareness of the linkages between turnover and hiring difficulties. These efforts include boosting benefits and bonus packages, offering more flexible and part-time work schedules, and creating opportunities for internal advancement. The following quotes give an idea of the variety of steps taken.

“Flexibility is a major benefit here, and this sets us apart from some of the other companies. We don’t penalize people if their kids get sick or their car won’t start. We offer flextime to make up the hours, for a better family-work balance”

“We introduced paid parental leave and added sick leave separate from our vacation.”

“We reduce mandatory overtime when we can to prevent turnover.”

“We introduced a weekend retention bonus. For every year you are on the weekend shift you get a \$3000 bonus.”

“We started giving our employees more opportunities to advance their skills by getting them on new product/new machines so they weren't doing the same machine or same parts every day. We also started a one-on-one personal growth program for those that want to grow themselves personally or professionally, including developing leadership skills.”

“We reduce turnover by offering employees different schooling they can do to level themselves up in their position. We are letting people know that if they take that training they can become certified and increase their skills and pay level.”

It is important to note that manufacturing still provides a pay advantage compared to other sectors. The area where manufacturing has not kept pace is in work schedules (let alone telecommuting!). That's why adding flexibility can go a long way towards preventing recruiting and retention difficulties.

The fourth most frequently adopted strategy, impacting 41 percent of hiring difficulties, is to increase the training given to new hires. As the labor market tightens and competition among firms for qualified workers increases, employers are clearly more willing to hire inexperienced candidates and then address their skills gaps internally, shifting from a “buying” to a “making” approach to skills formation. This option is extremely well suited to addressing skills-related hiring difficulties.

Here are some examples of the different ways in which the shift from buying the skills externally to building them from within can be accomplished.

“This type of trade (Machining and CNC Programming) requires years of experience to become effective and efficient so we have a small number of employees going through our apprenticeship program.”

“We increased the training because we had to broaden our candidate pool by lowering the bar of the skills that we required. We've hired interns that have no work experience from high school, we've hired interns from the local college, we've hired people who are interested in welding and paid for their training.”

“We couldn't find anybody. So we hired someone internally who was a Machinist, then hired someone to come in and train him so he could become a CNC Programmer.”

“The easiest position to fill is not even the case anymore. Even for assemblers, which are considered unskilled, we might get two applications a week. At this point we just created three new positions, that we call Trainees, for people who don't have the basic qualifications but who we believe are good, hardworking, accountable people, and we'll train them.”

“We used to have more requirements but we couldn't find them, so we are training them in-house. We had to drop the CNC experience and we have had to do our own training in-house in order to get candidates in the door. We also team up with two local colleges, and an instructor from the college comes in to train.”

“The 6G Bend test is a very challenging welding test. We offered onsite welding training through a collaboration among local employers, and this enabled us to enhance skills to fill the positions.”

These examples show a high degree of awareness on the part of employers that offering training and promotion opportunities enhances their ability to hire and groom the specific skills needed.

Many respondents who do not provide OJT expressed the desire to take action but cited barriers such as the cost of delivering the training, lack of interest for the opportunities offered, and competition from other employers who “steal” workers who receive training.

“Most high schools do not offer votech programs. Most tech colleges do not offer classes/programs for Tool Makers. A company could address the problem by hiring someone with a CNC degree and train them to make tools. We can't compete with them.”

“I would pay for someone to take welding classes at the local technical college and I would also offer an apprenticeship program if anyone was interested in working for us, but there isn’t anybody. I don’t know what we can do for that other than immigration.”

“When we get kids with post-secondary degrees we actually have to start training them from square one. They don’t know the difference between a standard screwdriver and a Phillips. They expect us to teach them so in a couple of years they can go somewhere else with more experience for more money. I now understand why firms move to automation.”

“Competitors like to steal my people because no one else is spending the time and effort to talk to high school kids and get them internships. And we actually spent time training our trainers so they could provide college level applicable training on our equipment to those new hires. We do it ourselves hoping to retain them, but if they leave us for a competitor we become the best trainers for other companies.”

This is a “tragedy of the commons” situation: the whole manufacturing sector would be more productive if every firm delivered internal training to broaden the pool of qualified workers, but individual companies believe they would be better off shifting the cost of training to their competitors. This perpetuates the problem by discouraging firms from devoting sufficient resources to building their pipeline internally.

The next most common strategy to overcome hiring difficulties involves partnering with local high schools or colleges, typically by recruiting on campus or offering student internships. Least common are partnerships around curriculum development and customized training. The reluctance to collaborate on curriculum design has many possible explanations. First, most critical competencies are firm-specific, often machine-specific, and not teachable outside of the company. Second, the technological landscape and the skills needed to harness new manufacturing technologies are evolving at an extremely rapid pace, making it hard for the educational system to keep up. Third, there is concern that working closely with schools will reveal too much about their technology to competitors or that applicants with a postsecondary credential will demand higher wages. Fourth, a few employers had disappointing experiences partnering with schools in the past⁵.

Whatever the underlying reasons, post-secondary schools are still underutilized sources of new talent even when employers identify skills gaps that could be filled with post-secondary credentials. The lack of cooperation with schools on what should be included in a well-rounded curriculum is likely to lead to dissatisfaction with the quality and quantity of applicants.

Other relatively less common actions taken by employers who reported hiring difficulties are lowering requirements of the position (24 percent) and offering internships (23 percent). Most employers have reached the bottom of their qualification requirements and the use of internships is constrained by cost and lack of interest from students.

Finally, employers made no changes in only 9 percent of hiring difficulties. This suggests that hiring difficulties were perceived as serious enough to prompt action.

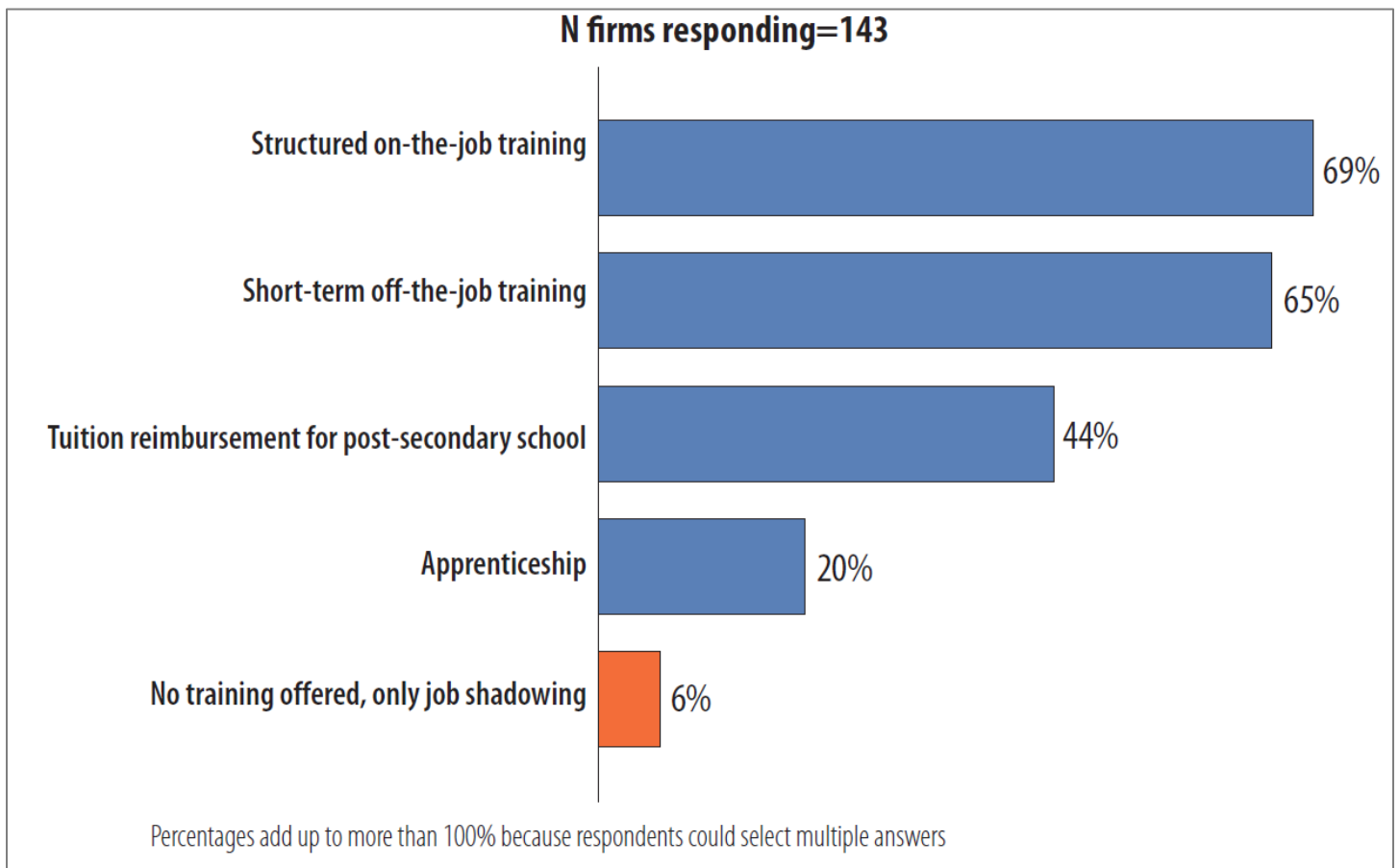
⁵ One employer referred to the post-secondary school as “hungry for money”; other employers found that partnering with high schools to organize visits to the facilities to expose kids to manufacturing careers turned into a “school trip”, and so the partnership did not last.

SECTION 5: METHODS PREFERRED BY EMPLOYERS TO TRAIN THEIR WORKFORCES

Given the importance employers attribute to skills learned on the job, this section documents what firms are currently doing to develop skills internally. These best practices can help employers bridge skills shortages before they turn into full blown hiring difficulties. Figure 9 shows the types of training that employers reported delivering over the last 12 months, regardless of whether they experienced hiring difficulties.

The most common type of training is formal in-house OJT. After deep cuts in training budgets during the Great Recession when skilled labor was abundant and firms could still find high school graduates with machine-shop skills, employers have ramped up investments to build their own internal pipelines. However, the effectiveness of OJT also depends on its length and content. Some firms offer only two weeks, others one year, and this variability likely leads to different outcomes. The longest and most structured form of workplace training, apprenticeships, are offered by only 20 percent of respondents and typically involve only a very small number of highly selected participants.

Figure 9: Type of Training Offered to New Hires or Incumbent Workers in Skilled Trades Positions Over the Last 12 Months



The second most common skill-building method, mentioned by two out of three surveyed firms (65 percent), is short-term off-the-job training, mostly for certifications in welding, forklift operator and boiler operator typically lasting less than two weeks.

Perhaps the most novel trend is the share of firms – 44 percent – that offer college tuition reimbursement to their employees and also use it to attract young applicants. The most comprehensive kinds of reimbursement cover tuition,

books and tools. This opens up great opportunities for Minnesota youth to obtain a college credential debt-free and for firms to attract young people who otherwise could not afford to earn a degree or would not have thought of manufacturing as a career. The opportunity to continue their education with a firm's sponsorship is definitely taken into high consideration by job seekers, yet employers lament that too few people are aware of these incentives.

For most employers, the best practices *for addressing talent shortages focus on a combination of both internal and external training*. In particular, 44 percent of firms offered both OJT and tuition reimbursement for post-secondary schooling.

Only 6 percent of surveyed firms did not implement any of the strategies discussed here and relied exclusively on job shadowing or other very informal methods to train new hires⁶.

The most effective models are based on collaborations between educators, students, and employers to provide classroom training and OJT at the same time. These initiatives, typically called "dual training", are often combined with a part-time work arrangement and the promise of continuing to work for the firm after finishing school. This is a win for all stakeholders: employers offer some tuition reimbursement in exchange for a guaranteed pool of entry-level workers that they can groom and retain; participants obtain affordable college-level training and the guarantee of a job; and local colleges increase enrollments and strengthen the quality of their instruction.

The following quotes give an idea of the variety of initiatives and why employers believe them to be effective.

"We try to recruit straight out of high school. We offer on the job training for HS grads where a supervisor will supervise them working on one machine at a time to gain experience. We also started offering tuition reimbursement for candidates willing to earn an associate's degree, because that is required to become a competent machinist."

"We are partnering with one of our local high school that is doing technical or welding classes. We are assisting them by providing material and doing tours of our facility for students."

"We have an internship/scholarship program that consists in paying VoTech students a certain amount per year if they agree to work for us and remain on an off-shift. I work pretty closely with local tech college to try to hire these interns. They work here while going to school, and once they graduate we will offer them a position."

"We have two dedicated fulltime trainers and a training area which is a simulation of the work they will do here. Employees can train anywhere from 4 weeks to 8 weeks, dependent on the role. We also offer tuition reimbursement for courses or credentials in communication, leadership, or business management to help our employees advance their skills so they can succeed within the company."

"Since we can't find the skills needed to be a technician, we have an internal apprenticeship program that will teach an operator to become a technician. We have a documented training process for that apprenticeship program that everybody goes through when they come onboard. For each machine there is a 3-6 month training process. For our entry level technicians, we partner with a local college for basics on machines. We also offer tuition reimbursement for anything related to your job. Even if you are the guy that fixes machines and you want to take an accounting class; we are open to paying for it. Furthermore, we follow up regularly with our employees. Every hourly employee in our company gets a review every 4 months with their supervisor or manager. And we are good at promoting from within."

"Completion of our apprenticeship program typically requires 3 years but credit is given for past work experience, allowing a participant to complete their apprenticeship in as little as one year. The key concept to apprenticeship is

⁶ Job shadowing typically lasts one or two weeks and involves pairing up the new hire with an experienced worker who is not officially tasked with training. On The Job Training lasts longer, is more formal, and involves a trainer-trainee relationship to build a broad set of competencies.

continuous learning throughout one's career, and this mindset has become pervasive through our workforce. I believe offering apprenticeships, on the job training, and tuition reimbursement has provided us with recognition in the employment market in our region and increased our applicant pool and also contributed greatly to low turnover."

These comments also show that the commitment to workforce training can help create a culture of continuous learning, which is critical to success in manufacturing. Firms must be able to adapt to rapidly evolving technologies and customer needs. However, these approaches tend to be costly.

It is not surprising that small firms are the least likely to offer OJT and tuition reimbursement. They are also least likely to have the organizational capacity to identify training gaps as they emerge, train the trainers, and offer mentorship and career growth opportunities. These firms are the most vulnerable to talent shortages because they have the fewest resources to address them.

SECTION 6: THE CRITICAL LINK BETWEEN TRAINING AND RETAINING

Most firms that averted hiring difficulties did so by promoting from within. This was achieved by building an internal pipeline of entry-level employees through methods that include enhancing internal training, establishing internships or trainee positions to create a pool of pre-qualified candidates, and improving retention by developing career paths and increased employee engagement. Here is how one respondent described this multi-pronged approach, emphasizing the inter-connection between training and employee retention:

"We have enhanced our training program, not with online training but with in-person, which is always the best and ensures that progress is being closely monitored. We have created job evaluations for all the machines here to help an employee learn. Our internal training lasts four to six months. We also partnered with schools: we offer a lab internship for college students to come and work here in the lab over the summer. We also have year-round mentoring and coaching because we want to help people succeed. Employees regularly meet with their supervisor or plant division manager. If someone needs coaching or help we follow up to let them know that we care. Follow up is so important. Probably one of the main reasons people leave is because they think no one cares. I would hope that no one here feels that way."

Failing to invest in training and retention can expose employers to higher future costs of replacing employees who leave the firm. High turnover in entry-level positions is particularly damaging, because it erodes the pool of workers who can potentially advance to the mid-skilled positions that are hardest to fill externally. It is a self-feeding mechanism: firms that struggle with high turnover are less in the position to train because they are left with fewer workers to upskill and because they face a higher risk -real or perceived- of losing their investment if trained employees leave.

One way out of this dilemma is to hire workers with some basic math and mechanical abilities and good work ethic who can be trained quickly (therefore at lower cost), and offer them opportunities to advance to positions of higher responsibility. This can be facilitated by creating a culture that encourages continuous learning and cross-training. This would decrease the need to hire external talent to fill the "skills gap."

Employers constantly emphasize that they would train if they saw good work ethic and mechanical aptitude, as shown in these quotes:

"We do on-the-job training only for those that we think have the skills to learn to be a machinist."

"If they had past mechanical aptitude to build on, even like working on a car or heavy equipment, we would hire them."

"We can bring in as assistant machinist, then from an assistant machinist to a machinist. But we do it only for those that we think have the skills to learn to be a machinist."

“High school kids don't seem to have a clue of what we do in manufacturing and they do whatever a friend is doing. That's why I have been to the High School and the High School came over a few times to our facility to help kids understand.”

High schools can play a key role in equipping students with the mechanical and math skills employers can build upon, and by exposing them to manufacturing as a field of work.

SECTION 7: STATE-SPONSORED INITIATIVES TO BUILD SKILLS IN NEED

The ever-changing needs of customers, combined with rapid technological advancements, make it particularly hard for businesses to keep up-to-date on the skills and competencies in highest need. Since every market is impacted differently, employers are on their own when it comes to determining which skills can be taught internally and which are best taught in post-secondary school. On the one hand, employers understand the strategic importance of their relationship with local colleges and high schools; on the other hand, working out the terms of such partnerships takes incredible time and effort.

State agencies such as DEED and DOLI have stepped in to serve as a catalyst, bringing together businesses and educators. Here are a few examples of college-employer collaborations mentioned by survey respondents:

- The Minnesota Advanced Manufacturing Partnership Program (MnAMP) launched the Learn Work Earn⁷ project with funds from the Department of Labor TAACCCT grants to develop work-based learning. Bringing together 12 community colleges in Minnesota, the program lets students work part-time for a local manufacturer while going to school. OJT is combined with traditional classroom instruction, allowing students to master their technical skills, gain experience in the field and earn wages to offset the cost of their education.
- The Minnesota Apprenticeship Initiative⁸ (MAI) funded by the Department of Employment and Economic Development and the Department of Labor and Industry, offers grants to assist employers with costs associated with developing apprenticeship programs. The goal is getting 100 companies to hire 1,000 apprentices by the end of 2020.
- The Pipeline Training program⁹, funded by the Department of Labor and Industry, supports employers in delivering work-based training together with classroom training through a partner college. Through this program, employers can hire students enrolled in trades-related post-secondary programs and provide them with OJT that relates to what they are studying in school. Employers also reimburse the cost of their tuition, with part of this funding coming from the State via a grant. The company agrees to offer participants a full-time position upon completion of their degree. In return, the students agree to work for the company for 2 years. The program also provides technical assistance to help employers identify internal skill needs and design delivery methods.

Such approaches are promising because they are focused on hands-on training and they specifically address some of the toughest barriers and disincentives employers face.

⁷ <http://support.skillscommons.org/showcases/apprenticeships/win-win/mnamp/>

⁸ <https://www.dli.mn.gov/mai>

⁹ <https://www.dli.mn.gov/pipeline>

CONCLUSIONS AND IMPLICATIONS

Based on in-depth interviews with Minnesota manufacturing employers on 1,072 job vacancies in skilled production occupations, the major findings of this study are summarized below.

*Firms seeking to fill positions in occupations requiring long-term on-the-job training, such as machinists and CNC machinist, in industries that are low-tech, such as metal and food manufacturing, were more likely to cite difficulty filling positions.

*While employers reported general hiring difficulties in 62 percent of vacancies, just 10 percent of all vacancies were hard-to-fill solely because of lack of skills in job applicants. Hiring difficulties were most frequently the result of a mix of skills gaps and undesirable job or firm characteristics. When demand-side issues were cited, inconvenient shifts and uncompetitive wages were the biggest barriers, followed by location and ineffective advertising. When skills gaps were cited as a problem, employers pointed out that such skills are more effectively acquired through OJT.

*Sixty-eight percent of hard-to-fill positions attracted very few candidates, with 10 or fewer applications being the norm. Employers attribute this problem to either general disinterest in production work (an “image problem”) or to a combination of skills gaps and undesirable job characteristics that discourage people from applying.

*The measurable characteristics most strongly associated with hiring difficulties were industry sector, occupation, firm geographic location, firm size, turnover, education requirements of a vacancy, and a firm’s provision of on the OJT. The large impact of turnover suggests the presence of a causal relationship between undesirable job characteristics and hiring difficulties. On the other end, the large impact of education requirements demonstrates the existence of skills gaps at the *middle* of the skills range. The skills that employers are having the most trouble finding are taught through vocational/technical training provided either in high school or in college.

*Firms that did not experience hiring difficulties promoted and hired from within, which is made possible through investments in internal training and/or collaborating with colleges to provide some of the training tailored to employers’ needs. The report provides plenty of examples of the creative ways employers and local colleges found common ground to build a continuous talent pipeline.

*Regardless of the reason for the hiring difficulty, the primary response by employers was to improve advertising methods, followed by making the job more attractive with or without increasing the wage. Enhancing internal training to new hires especially through structured on-the-job training is also gaining considerable traction, especially in combination with strategies aimed at attracting young talent through internships and tuition reimbursement plans. The combination of internal and external training is increasingly recognized as a best practice for bridging talent shortages. Firms that do not implement these actions often wish they could, but cite resource constraints and fear of poaching from competitors as barriers. It is important to note that the implementation of internal and external training is highly correlated with firm size: small firms are the least likely to be able to afford this approach.

These findings reinforce what stakeholders have known for years: The pipeline problem lies at the root of hiring difficulties in manufacturing. Lack of student interest discourages post-secondary institutions from offering more classes in these fields. High turnover and employee poaching discourage firms from investing in OJT and deprive them of internal candidates to promote. As talent is lost to retirements, the capacity to provide good quality training diminishes. Last but not least, high-schools and post-secondary schools are still underutilized sources of new talent, reducing the chances of building the pipeline fast enough to offset retirements. Disincentives to employer-provided training can cause an overall decline in workforce skills across the manufacturing sector.

Minnesota employers are investing in solutions that can solve the pipeline problem in its various forms. Demand factors are more often acknowledged and addressed, and firms are shifting from a strategy of buying skills from outside to

building skills internally. The supply-side problem cannot be solved with increasing graduation rates in vocational training and Associate's degree programs alone, but rather with a coordinated set of interventions at different levels of the workforce system, including the following:

1. There is an urgent need for the education system to expand opportunities to develop math and mechanical skills. Without a good foundation in these skills, manufacturing employers, especially small firms that rely on a high-school educated talent pool, cannot effectively bring new hires up to speed and train them further. Strengthening math instruction and adding vocational courses at the high school level could help develop these skills and expose students to manufacturing careers.
2. Increased collaboration between employers and technical colleges to offer internships and work-based learning opportunities tailored to the unique needs of a region and industry would be a useful step. Whenever possible, the partnership should involve updating the curriculum with industry-approved competency standards in order to improve the alignment between school offerings and employer needs.
3. Efforts on the part of employers to expand OJT and make skilled production careers more attractive must continue. Results show that OJT is effective in reducing the likelihood of hiring difficulties, and suggest that policy interventions focused on enhancing a firm's capacity to deliver structured OJT through technical assistance make sense. Furthermore, the efforts employers are making to improve the quality and image of their jobs are paying off, and these changes will hopefully encourage more job seekers to seize these job opportunities. Lastly, these efforts cannot have maximum impact unless more young people are made aware of the excellent opportunities available in manufacturing, including access to an affordable college education, technical skills acquisition opportunities and the potential for career advancement.

While the challenges outlined in this article and resulting recommendations have been known and discussed for years, finding practical ways to implement and fund effective solutions is still a huge challenge. Evidence from this and previous studies unequivocally show that without greater investments in internal training and collaboration with high schools and post-secondary schools employers will face greater costs filling their skill needs, especially in industry sectors and regions where retirements hit the hardest.

As technology advances, many of the careers highlighted in this study will require even more highly skilled workers. If more jobseekers, especially youth, get early exposure to these fields, they will likely see them as paths to good paying jobs, and a renewed interest in skilled production could emerge as a result.

APPENDIX I: Relative Likelihood of Experiencing Hiring Difficulties Logistics Regression

Dependent Variable: Vacancy is hard to fill		
Observations: 1,072		
A positive coefficient indicates a positive relationship and a negative coefficient indicates a negative relationship		
Independent Variables		Coefficients (Standard Errors in parenthesis)
Firm size	Medium (56-249 employees)	-1.613*** (0.391)
	Large (250 employees and more)	-1.142*** (0.392)
Firm location (Reference: Central and Northeast Planning Regions)	Southeast Planning Region	-5.009*** (0.655)
	Southwest and Northwest Planning Regions	-2.766*** (0.489)
	Twin Cities Metro Planning Region	-3.408*** (0.536)
Education level (Reference: high school)	Completed a Vocational or Associate's credential	1.855*** (0.309)
	Completed a Bachelor's degree	0.344 (0.810)
STEM industry (reference: not a STEM-related industry)	Industry is STEM-related	-3.100*** (0.662)
Firm delivered formal training (Reference: firm did not offer OJT or apprenticeships)	Firm delivered structured on-the-job training or apprenticeships over the last 12 months	-0.789*** (0.287)
Turnover (Reference: no turnover)	Position has had turnover over the last 12 months	1.764*** (0.269)
Benefits (Reference: no benefits)	Position offers Retirement, Health Care, or PTO Benefits	2.108*** (0.577)
Fixed effects	Industry, Occupation, and Selected Large Employers	Yes
Constant Term		2.489 (1.548)
Nagelkerke R square		0.680
*p<0.1; **p<0.05; ***p<0.01 Coefficients marked with *** can be considered to provide strong evidence against the null hypothesis of no effect on the probability of a vacancy being hard to fill.		