



EXAMINING THE RETURN ON INVESTMENT OF MANUFACTURING CREDENTIALS

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TABLE OF CONTENTS

ABOUT THE RESEARCH STUDY.....	1
--------------------------------------	----------

PART 1: BACKGROUND AND METHODOLOGY

BACKGROUND.....	3
------------------------	----------

Many Manufacturing Jobs are Highly Skilled and Difficult to Fill	3
--	---

Manufacturing Workforce.....	4
------------------------------	---

Role of Credentials in the Manufacturing Workforce.....	5
---	---

RATIONALE FOR THIS STUDY	8
---------------------------------------	----------

METHODS.....	9
---------------------	----------

Frontline Workers/Credential Holders	9
--	---

Supervisors	10
-------------------	----

Hiring Managers	11
-----------------------	----

ANALYSIS.....	12
----------------------	-----------

Sampling Strategy and Outreach	13
--------------------------------------	----

Effect of COVID-19 on the Research Process	13
--	----

PART 2: RESULTS AND DISCUSSION

OVERVIEW OF INTERVIEWS	16
-------------------------------------	-----------

COMMON INTERVIEW THEMES AMONG ALL PARTICIPANTS	18
---	-----------

Value for Credentials	18
-----------------------------	----

Confusion about the Worth of Specific Credentials.....	19
--	----

INTERVIEW THEMES FOR WORKERS/CREDENTIAL HOLDERS	20
--	-----------

Workers Find Value in Credentials and Training.....	20
---	----

Workers Know Which Skills They Want to Pursue.....	22
--	----

Workers Seek Training Through Traditional and Non-traditional Providers.....	23
Workers Have Limited Knowledge of which Credentials are Valuable	25
INTERVIEW THEMES FROM EMPLOYERS.....	26
Employers Prefer Industry Credentials, but See Few in their Applicant Pools	26
Employers Struggle to Track Employees' Credentials.....	26
Employers Have Limited Awareness of Credential Content	27
Employers Rarely Signal Value for Workers' Recently Earned Credentials.....	29
ADDITIONAL FINDINGS	30
Capacity Constraints Exist for Frontline Workers for Online/Remote Training at Scale.....	30
Local Training Partnerships Dominate	30
Logistics/tracking Skills Was a Part of Nearly Every Worker's Role	31
DISCUSSION	32
No Clear Source of Information for Credentials.....	32
Remember the Self-Selection Bias	32
INTERVIEW CONCLUSIONS.....	33
 PART 3: RECOMMENDATIONS	
RECOMMENDATIONS TO SUPPORT A MORE HIGHLY SKILLED AND EFFICIENT MANUFACTURING WORKFORCE	35
Recommendations for Manufacturing Facilities.....	35
Recommendations for Policymakers	38
Recommendations for Future Research.....	40
FINAL THOUGHTS.....	43
ENDNOTES.....	44

ABOUT THE RESEARCH STUDY

The U.S. manufacturing sector continues to be central to the national economy, and relies on a highly skilled workforce of more than 12 million workers. The majority of jobs in manufacturing are likely to require a high school diploma or less. Because of this, credentials have uneven use in the manufacturing industry and are not routinely required or used as a major factor in hiring or promotion decisions.

In order to more effectively use credentials to support a competitive manufacturing workforce, and in follow up to the first report developed that examined the quality, market value, and effectiveness of manufacturing credentials,¹ Workcred—an affiliate of the American National Standards Institute (ANSI)—again partnered with MEP, an operating unit of NIST, to understand how manufacturing employers and workers value credentials, which credentials they value, and how they determine whether or not to pursue additional credentials.

Workcred developed a set of three interview guides to use to address these questions with direct interviews with front-line workers (credential holders), hiring managers, and supervisors at small- and medium-sized manufacturing facilities.² By examining the viewpoints from these three different stakeholder groups, Workcred anticipated a more nuanced understanding of the use and value of credentials in this important sector.

This report details the project background and methodology, results and outcomes of the research, and recommendations to make an immediate impact to support the manufacturing workforce.

THE PRIMARY RESEARCH QUESTIONS ADDRESSED BY THIS RESEARCH STUDY ARE:

How are U.S. Manufacturing employers and workers using credentials?

What is the return on employer and employee investments in credentials?

PART 1 BACKGROUND AND METHODOLOGY



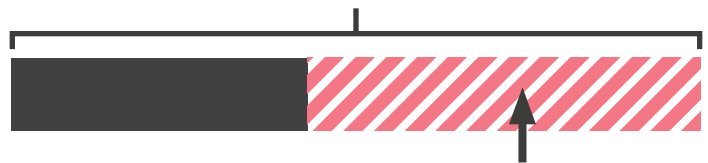
BACKGROUND

MANY MANUFACTURING JOBS ARE HIGHLY SKILLED AND DIFFICULT TO FILL

Studies confirm that skilled manufacturing jobs are difficult to fill and there is a shortage of individuals who possess the right skills. According to a study by Deloitte and the Manufacturing Institute, an affiliate of the National Association of Manufacturers, while nearly 3.5 million manufacturing jobs will likely be needed over the next decade, two million are expected to go unfilled due to this skills mismatch. As of 2017, nearly one-quarter of the sector's workforce are age 55 or older,³ suggesting that many people currently employed will soon reach retirement age, which will intensify the need to find new skilled employees. The COVID-19 pandemic has also revealed the increased need for domestic manufacturing of critical and/or essential supplies, which may result in new manufacturing facilities and additional demand for frontline workers in the U.S.

Furthermore, the U.S. manufacturing sector is being impacted by the larger workforce shift in the U.S. toward a knowledge-based economy, which can be defined as “production and service based on knowledge-intensive activities that contribute to an accelerated pace of technological and science advance[ment], as well as equally rapid obsolescence.”⁴ There is consensus from multiple studies that manufacturing facilities are impacted by digitization at every point along the value chain, although this impact will vary according to manufacturing sub-sector.⁵ This change will require workers to be trained to use these new digital tools. It will also require employers to

3.5 million manufacturing jobs will be needed over the next decade...



... 2 million of which could go unfilled due to skills mismatch.



One quarter of the sector's workforce is age 55 or older.

develop workforce planning and recruitment strategies that are agile and capable of finding individuals with the right skills sets.

MANUFACTURING WORKFORCE

The manufacturing workforce is comprised of more than 12 million workers, which includes more than 8 million production and nonsupervisory workers, as well as other frontline workers. While the recent pandemic has impacted employment in other sectors, the unemployment rate in manufacturing remains low: it was reported to be 1.8 percent in December 2022.⁶

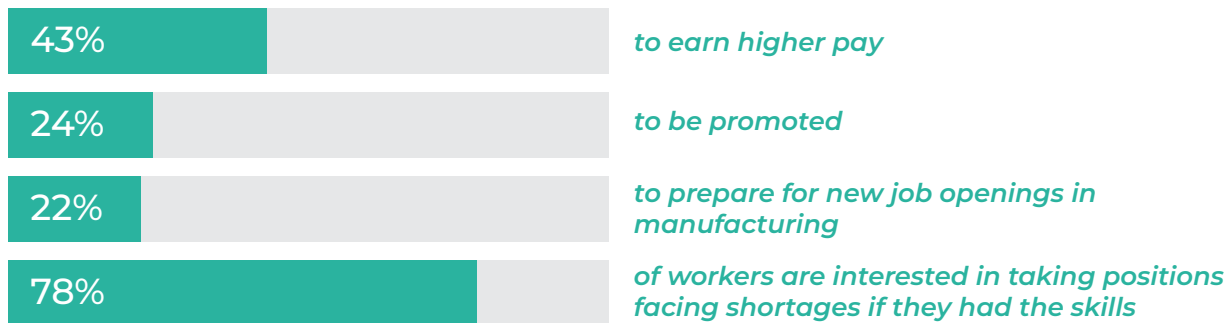
The majority of jobs in manufacturing are likely to require a high school diploma or less, although some may require a license or other credential. However, many frontline manufacturing workers are highly skilled, having acquired their abilities through on-the-job learning or other informal approaches, which are not typically tracked.

A 2018 survey of nearly 9,980 hourly manufacturing workers offers additional insight into the profile and motivations of frontline workers who learn new skills and earn credentials (see Figure 1).⁷

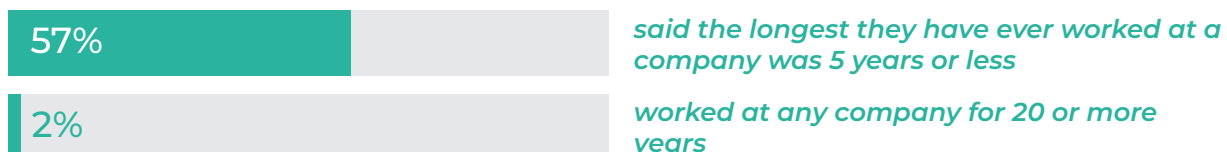
Figure 1: Motivations of Frontline Workers Seeking Credentials



The primary motivation for learning new skills was:



Manufacturing workers are highly mobile:



ROLE OF CREDENTIALS IN THE MANUFACTURING WORKFORCE

Credentials are powerful tools that can be used by workers and employers to more effectively and efficiently support personal and professional goals (see Figure 2). For many roles and occupations outside of manufacturing, credentials are used as a signal of skills, knowledge, and abilities. Advanced credentials and/or combinations of multiple credentials typically signal higher-level or specialized skills; this is especially true for post-graduate credentials. Employer demand for credentials, such as four-year degrees, has grown over the past decade, as seen in the increased requirement of baccalaureate degrees in job postings and wage premiums.⁸

Figure 2: How Credentials Differ⁹

	CERTIFICATE	CERTIFICATION	DEGREE	LICENSE
Awarded by	Education and training providers, employers, labor unions, and industry associations	Industry certification bodies	Education institutions	Government agencies
Awarded after	An exam at the end of a training or education course or a one-time assessment	Third-party, independent competency assessment	Course of study	Meeting requirements of an occupation
Indicates	Education/knowledge/skills	Skill mastery / competencies	Education, successfully passed courses	Legal permission
Time to Complete	Variable, generally less than 2 years	Variable	Variable, generally 2 years or more	Variable
Time and Renewal Requirements	Often no time limit, no renewal requirement	Time-limited, includes recertification	No time limit, no renewal requirement	Time-limited, renewal generally required
Revocation Process	Cannot be revoked	Can be revoked for incompetence or unethical behavior	Cannot be revoked	Can be revoked for incompetence or unethical behavior
Examples	CNC Machinist, Global Supply Chain, Mechatronics	AWS Certified Welder, Certified Quality Inspector, Certified Supply Chain Professional	Bachelor of Science in Engineering	Electrician, Professional Engineer
Standard for Accreditation	ANSI/ASTM E2659-18, a globally recognized American National Standard	ANSI/ISO/IEC 17024:2012, an international and national standard	National, regional, or programmatic	State law defines scope of practice

Research has shown that manufacturing employers do not place the same emphasis on credentials when hiring. In a recent study, senior staff in manufacturing facilities in Michigan revealed that 80–95 percent of positions do not require any postsecondary credentials, and only 5–20 percent of positions in their facilities required formal training or education.¹⁰ However, this study had a narrow geographical area and encompassed only five manufacturing facilities and one association, making it difficult to generalize the findings.



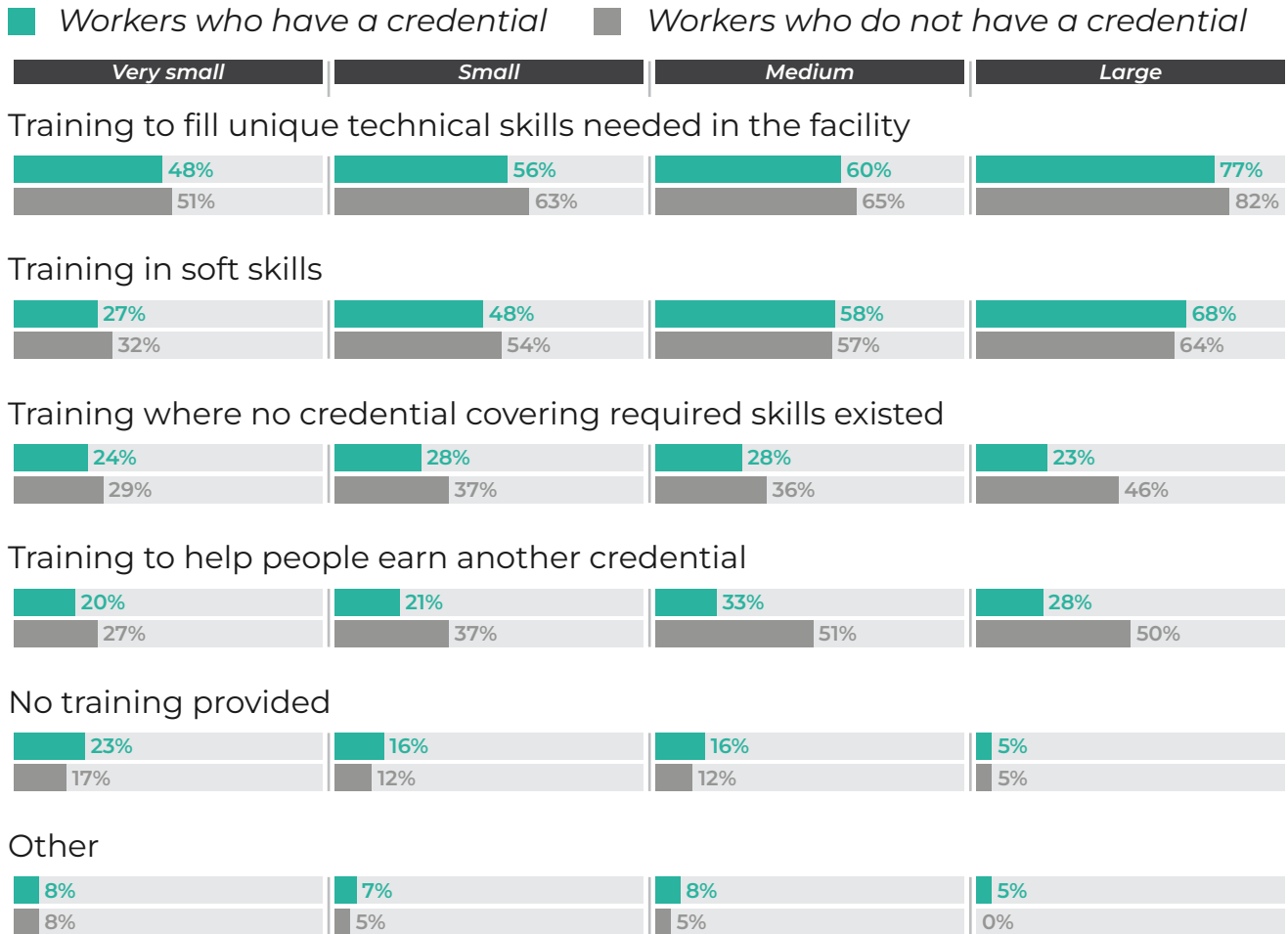
In 2018, Workcred completed a three-year research project, funded by NIST MEP, examining the quality, market value, and effectiveness of manufacturing credentials in the U.S.¹¹ The project used a combination of surveys, focus groups, and literature reviews to examine nine research questions on the use of credentials by small, medium, and large manufacturing facilities throughout the U.S. Survey respondents (n=945) spanned more than 20 manufacturing sectors and included responses from facilities in all 50 states and Puerto Rico.

That study revealed that credentials have uneven use in the manufacturing industry and are not routinely required or used as a major factor in hiring or promotion decisions. Moreover, many manufacturers do not view credentials as the most relevant tools to identify new skilled personnel or as incentives to improve the quality of their existing workforce. In fact, manufacturers often did not know what credentials are available or how they are relevant to jobs in their workplace, which may stem from their belief that they need to train new employees regardless of whether or not they held a credential. In addition, manufacturers could not quantify whether credentials added value in terms of reduced cost or reduced training time.

That study also showed that the overwhelming majority of manufacturers are making significant investments in employee training (See Figure 3). Manufacturers provide 48–82 percent of their employees with training to fill the unique technical skills for their facility. They also provide up to 68 percent of their employees' training

in soft skills. Only 8 percent of employers are not providing skills training to their employees.

Figure 3: Type of Training to Up-skill Frontline Manufacturing Workers Who Do and Do Not Hold a Credential According to Facility Size¹²



Overall, this data shows that frontline manufacturing workers are highly mobile and skilled. It also suggests that while they have undergone extensive training, many lack credentials, resulting in a limited ability to validate their skills and competencies and communicate them to potential employers in a portable, transparent way. From the employer perspective, employers are making a significant investment in training and skills for their employees as they seek to develop a workforce that meets their evolving needs. However, this existing data also reflects a lack of knowledge of how credentials are currently being used by workers and employers in manufacturing, as well as identifying how they might be more effectively used to meet the needs of both of these groups.

RATIONALE FOR THIS STUDY

Due to the unanswered questions from the 2018 study, and to develop deeper insight into understanding the role and value of credentials in manufacturing, new research was needed. More specifically, Workcred designed this research study to understand how employers and workers value credentials, which credentials they value, and how they determine whether or not to pursue additional credentials.

As previously mentioned, the primary research questions addressed by this research study included how are U.S. manufacturing employers and workers using credentials, and what is the return on employer and employee investments in credentials?

Through the use of the three interview guides, Workcred conducted direct interviews with frontline workers (credential holders), hiring managers, and supervisors at small- and medium-sized manufacturing facilities. By examining the viewpoints from these three different stakeholder groups, Workcred anticipated a more nuanced understanding of the use and value of credentials in this important sector.



METHODS

This study relied on interviews with 51 individual workers, hiring managers, and frontline supervisors at 15 small- and medium-sized manufacturing facilities. To access workers, the study primarily relied on the NIST MEP's national network of MEP centers to help recruit manufacturing facilities willing to participate with the research. While the original plan was to conduct all interviews in-person, due to the COVID-19 pandemic the initial interviews were conducted remotely. However, as the pandemic eased, interviews returned to in-person.

Each facility was requested to provide at least one frontline worker/credential holder, one supervisor, and one hiring manager to participate in interviews. In many cases, the opportunity to interview additional workers within each group was offered and accepted. Interviews followed pre-approved interview guides, which were tailored for each role in the facility. In most cases, only one member of the research team conducted the interviews; therefore, we requested (and received) permission to record all interviews so that other members of the research team could also review and analyze the qualitative data collected at a later date. Interviewees were not compensated for their participation in this study, so every effort was made to avoid interfering in facilities' production schedules.

In general, interviews ranged in duration from 20–60 minutes. They were conducted on an individual basis unless individuals requested to be interviewed in a group format, and supervisors and hiring managers were interviewed separately from those who were identified solely as credential holders to avoid any situation in which supervisors' or hiring managers' presence could influence responses.

FRONTLINE WORKERS/CREDENTIAL HOLDERS

The interview questions for frontline workers/credential holders focused on identifying the characteristics of each post-secondary credential held, asking them to provide information about the attributes (e.g., issuers, renewal cycles, continuing education requirements) of credentials they held that did not yet appear in third-party databases such as the U.S. Department of Labor Employment and Training Administration's Certification Finder.¹³ We also collected data on credentials that

appeared at the time to be unrelated to manufacturing in the interest of understanding the value of non-manufacturing credentials to manufacturing workers. Credentials within scope for this part of the interview included certificates, certifications, apprenticeships, badges, licenses, and associate, baccalaureate, and graduate degrees—though the majority of credentials reported in these interviews were certifications and certificates.

For each credential, the interview questions attempted to gauge the value of the credential as perceived by the credential holder and any direct benefits the credential holder experienced in his or her day-to-day employment from holding the credential. Credential holders were also questioned regarding their plans for obtaining additional credentials, the availability of support within their organizations for earning credentials, and their general view of the value of credentials.

As we proceeded with our research, we found that the term “credential holder” in reference only to frontline workers was somewhat limiting insofar as supervisors and hiring managers were equally likely, if not more likely, to hold credentials relevant to the manufacturing sector. As such, some individuals originally recruited through the supervisors and hiring managers groups volunteered to complete the credential holder interview in addition to the interview for their primary role. In fact, we interviewed multiple individuals fitting into each group in most facilities.

SUPERVISORS

Supervisors were asked a tailored set of interview questions focusing on their perceptions of the value of credentials. Rather than focusing on the attributes of specific credentials, the interview questions for supervisors focused more on general perspectives on credentials in the manufacturing sector, including their quality and the adequacy of currently available credentials to meet the facility’s business needs. Supervisors were also asked about how they track and reward credential attainment within the facility’s workforce. As noted above, some supervisors also volunteered to answer questions from the credential holder questionnaire in cases where they personally held manufacturing credentials.

HIRING MANAGERS

Hiring managers responded to a set of questions that focused on the role of credentials in the hiring process. The questions attempted to gain insight into which credentials were perceived to be of value when hiring for specific roles and what trends they observed in the credentials held by individuals applying for positions in their organizations. Questions also addressed partnerships firms may have with specific training providers and firm-wide or facility-level policies that support credential attainment, such as the criteria against which requests for certification fee reimbursement would be considered. Again, as relevant, hiring managers were sometimes asked about their own credentials in situations in which they could also be counted as credential holders.



Members of the research team met to compare notes from interviews they conducted and share initial reflections, which were confirmed by referencing the interview transcripts. The analysis looked for patterns in which multiple individuals across multiple facilities confirmed a particular insight or theme, whether about a particular credential or type of credential, or a particular facility-level practice. These common themes that emerged were again cross-referenced against our database to ensure that our insights reflect actual practice in the manufacturing sector. Where appropriate, we considered discrepancies between our findings and those of the relatively few other researchers who have also examined workforce development in the manufacturing sector.

SAMPLING STRATEGY AND OUTREACH

The study primarily relied on local MEP Centers to help source facilities to participate in our research. The research team visited any manufacturer involved in producing any type of product, regardless of location or size (though MEP Centers primarily serve small- and medium-sized facilities).

Recruitment of facilities willing to participate and scheduling the interviews was a significant hurdle for this study. The structure of this research (interviewing a credential holder, hiring manager, and supervisor from the same facility) required outreach to facility managers rather than directly recruiting these interviewees. This meant that these managers were gate-keepers for conducting any interviews. While representatives of facilities that declined to participate generally did not give specific feedback on why they declined, some may have perceived participating in research to represent an administrative or logistical burden.

EFFECT OF COVID-19 ON THE RESEARCH PROCESS

The COVID-19 pandemic—and the associated changes to facilities' visitor policies and general strain that it placed on organizations—was a root cause of the difficulty in organizing research visits, and affected every phase of this study. The initial outbreak occurred just as the project team was finalizing the interview guides in February 2020, which delayed the process to obtain administrative approval from the U.S. Office of Management and Budget and George Washington University's Institutional Review Board.

Once approval was in hand, public health conditions required conducting all interviews virtually, which was another hurdle. Manufacturing facilities struggled to coordinate these virtual visits for a reason that became evident after visiting the facilities in person: facilities have very few computers accessible to frontline workers, as most machines on the production floor are not operated by personal computers. Even when computers existed within a facility and were accessible to individuals most likely to be classified as credential holders, they may not have been equipped for virtual conferencing.

Project members began conducting in-person site visits in August 2021; however, the COVID-19 pandemic continued to impact the interviews—for example, one facility in Tampa had to cancel their scheduled interviews due to an outbreak of the Delta variant within their facility. Other facilities' senior management provided feedback that they were reluctant to have non-essential, outside individuals visiting due to the risk of COVID-19 transmission. Moreover, the inconsistencies in supply and demand for labor unleashed by the global pandemic put a strain on many of the facilities visited. Several interviews were scheduled and then canceled due to staffing limitations—frontline workers were needed on the production line and could not participate in interviews.

Nevertheless, participating facilities are diverse enough to represent the experiences of many small- and medium-sized manufacturing firms in the U.S., although the study likely would have benefited from the participation of additional manufacturers.

PART 2

RESULTS AND DISCUSSION



OVERVIEW OF INTERVIEWS

As outlined in the previous section, Workcred developed a set of interview guides to gather input from three different stakeholder groups—frontline workers (credential holders), hiring managers, and supervisors. We conducted 51 interviews within 15 facilities across seven industry sectors during this research study. The interviews were all conducted at small- and medium-sized manufacturing facilities, a few of which were independently owned, although the majority were part of a larger company that owned multiple facilities. Approximately half of the facilities that were part of a larger company had a facility located outside of the U.S.

As seen in Figure 5, the overwhelming majority of interview subjects were male. While we did not collect other specific demographic information, the majority of interview subjects were white and over the age of 35. Among the interviewees, 21 were supervisors, 8 were hiring managers, and 22 were frontline workers.

Figure 5: Overview of Interview Participants

The overwhelming majority of interview subjects were **MALE**.

21 SUPERVISORS



8 HIRING MANAGERS

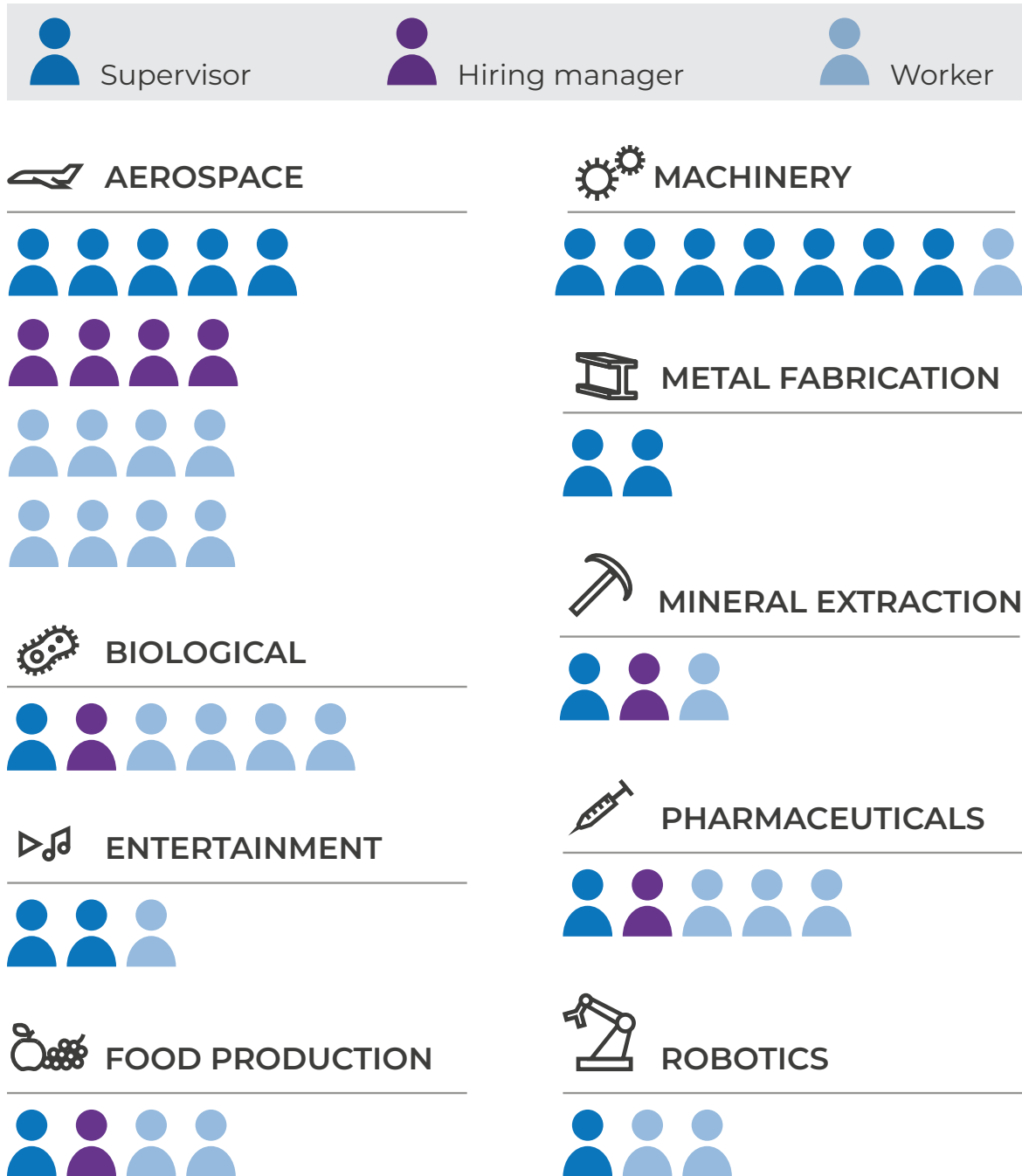


22 FRONTLINE WORKERS



Figure 6 shows the industry breakdown and positions of each interviewee. We discovered that since many facilities did not have a dedicated hiring manager, the supervisor fulfilled the role of hiring manager for positions they would supervise.

Figure 6: Industries and Positions Represented



As shown in Figure 4: Credentials Mentioned During Interviews (page 12), data was analyzed by having all interviews transcribed and assembling a chart of all credentials reported by study participants.

COMMON INTERVIEW THEMES AMONG ALL PARTICIPANTS

Regardless of the geographic location, industry, or job role held, there were two common themes that were uncovered during the interviews: a value for credentials and confusion about the worth of specific credentials.

VALUE FOR CREDENTIALS

Both employers (supervisors and hiring managers) and workers spoke about the value they placed in credentials. Employers suggested that they valued credentials of job candidates and expressed a desire that more candidates had credentials. Workers with credentials typically felt that they had received some benefit from pursuing their credentials.

Furthermore, while many interviewees expressed value for credentials, most employers noted that only a minority of their workforce was credentialed. This lack of credentials in the manufacturing workforce was underscored in the interview recruitment process: one of the challenges in recruiting companies to participate was that many companies that were asked to participate reported that none of their frontline workers held credentials. While this does not contradict their expression of value for credentials, it does suggest that credentials are only one of many factors taken into consideration when hiring or promoting workers.

These results are also consistent with previously published research on credentials in manufacturing. Renski found that while there was an average earnings premium of \$70 per week for manufacturing workers who held a certification or license, returns are uneven.¹⁴ This likely reflects differences in industries and occupations, as well as what employers express in value of credentials. Our 2018 study of manufacturing credentials found that employers greatly valued experience as well as credentials, with some small- and medium-sized companies valuing experience more than credentials.¹⁵

CONFUSION ABOUT THE WORTH OF SPECIFIC CREDENTIALS

The employers and workers interviewed expressed a lack of readily available information on credentials relevant to their industries, occupations, and/or career pathways. They overwhelmingly depended on word of mouth or recommendations from supervisors and co-workers for information on the value of credentials. For employers, this typically meant that they relied on existing relationships and trusted their local/regional community colleges, MEP Centers, and equipment manufacturers to provide education and training for their employees.

This also resulted in an oft-repeated statement of “trust, but verify”—employers repeatedly noted that they prefer to verify the skills represented by credentials through on-the-job observation, competency-based assessments performed as part of the job interview process, or a combination of the two. Job applicants were often asked to operate a particular machine or perform a task under the supervision of the hiring manager or prospective supervisor prior to hiring. Only very rarely did candidates with industry credentials fail these assessments, but employers felt that such hands-on assessments were a low-cost way to ensure the quality of their hires.

One potential contributing factor to the lack of understanding of the value of specific credentials in manufacturing is that there are sub-sector specific credentials for some industries. For example, at one biotechnology manufacturer, the Certified Tissue Bank Specialist certification issued by the American Association of Tissue Banks was essential to the specific processes used in the facility. This certification is not likely to be valued outside of biotechnology manufacturing.

Similarly, in aviation, the Federal Aviation Administration (FAA) repairman certificate is essential; it is actually a license insofar as it is statutorily required to repair and/or supervise the repair of certain aircraft parts. While some tasks on the floor of an aircraft parts manufacturer or refurbisher can be performed by an unlicensed individual under the supervision of a licensed mechanic, holding a FAA certificate is essential to advancement beyond the most entry-level job titles in such a facility. Understanding of the value of these types of industry-specific credentials is needed in order to support employers and workers in these industries to effectively use these credentials.

INTERVIEW THEMES FOR WORKERS/CREDENTIAL HOLDERS

There were also several themes that were consistently mentioned by workers about their credentials and training.

WORKERS FIND VALUE IN CREDENTIALS AND TRAINING

Many workers interviewed stated that they found value in multiple ways from earning credentials and/or participating in training. For example, many workers felt that they used the knowledge they had gained while earning a credential or participating in training on a regular basis at their current job. Others felt that a credential or training directly led to being hired, a promotion, or a change in occupation at their facility. One worker powerfully described the role that gaining an Airframe and Powerplant (A&P) license played in his career:¹⁶

I WAS WORKING DEAD-END JOBS FOR MOST OF MY YOUNG ADULT LIFE, AND WHEN I GOT HERE, IT WAS JUST A GAME CHANGER OR SOMETHING, BECAUSE ONCE YOU HAVE IT, YOU DON'T LOSE IT UNLESS YOU REALLY MESS UP. AND IF YOU HAVE AN A&P, YOU CAN GO CHASE THE MONEY ANYWHERE YOU WANT IN THE WORLD. SO IT WAS JUST KIND OF A LIFE CHANGER FOR ME TO GET IT RIGHT.

Interestingly, this individual used this credential to move internally within the company to his current role, highlighting how credentials can support promotion and occupational change within an industry or facility.

Another worker expressed that credentials provided the opportunity to have more professional status and job satisfaction:

I THINK [THE CREDENTIAL] WAS WORTHWHILE, NOT JUST FOR THE PAY SCALE, BUT ALSO JUST MY OWN ABILITY LEVEL HERE. AND I THINK THE REASON THAT'S IMPORTANT TO ME IS IT'S GOING TO MAKE MY PAY SCALE KEEP GOING UP. I'VE HIT A POINT WHERE I AM ONE OF THE HIGHER-SKILLED GUYS... I MEAN, THERE'S A LOT OF GUYS IN THAT TIER HERE, BUT IT'S NICE TO BE IN THAT TIER. IT'S NICE TO BE TROUBLESHOOTING MY OWN STUFF AND NOT JUST RUNNING PRODUCTION. AND IT'S A MORE FULFILLING JOB.

These comments reflect the varied roles credentials can play in the workforce—providing professional recognition or some other type of intangible value like self-satisfaction.

Workers also found training to be highly valuable to their ability to do their jobs. All workers reported that their current employer provided them with hands-on training. Interestingly, workers sometimes did not remember if they received a credential after completing a formal training program. This inability to remember whether or not a credential was awarded or the type of credential awarded complicates efforts to ascertain the value of credentials.

Similarly, gauging the value of hands-on training is difficult when workers are not given a formal record of the training or it does not lead to a credential. This lack of documentation may explain the significant importance employers place on previous experience in manufacturing, as it is a proxy for on-the-job training and skills.

WORKERS KNOW WHICH SKILLS THEY WANT TO PURSUE

When asked about skills or credentials they would like to gain, approximately half of the workers mentioned a highly technical, digital skill as shown in Figure 7.¹⁷

Figure 7: Technical/Digital Skills Mentioned During the Interviews

- » 3-D printing
- » 3-D scanning
- » Artificial intelligence/machine learning
- » Augmented reality
- » Basic computer skills
- » Computer-aided design (CAD)
- » Computer numerical control (CNC) machining
- » Cloud computing
- » Excel
- » Data analytics and visualization skills for logistics
- » Digital thread technology
- » Digital twinning
- » Electrical
- » Generalist training to include math, physics, mechanics, and other concepts
- » Geometric dimensioning & tolerancing (GD&T)
- » Lean/Six Sigma
- » Mechatronics
- » Original equipment manufacturer (OEM) training
- » Robotics
- » Safety skills/knowledge
- » Software (specific type)
- » Soldering
- » SolidWorks
- » Standards training

Not surprisingly, these are skills currently being used in these small- and medium-sized facilities. For example, multiple facilities that participated in the interviews used three-dimensional (3-D) printers, though they varied in the nature of their uses. In some, 3-D printing was reserved primarily for repairing equipment, whereas in others, 3-D printing was integrated into the production process. In one case, a worker reported being able to use 3-D printers at a local community college in lieu of the employer owning its own equipment. The skills required to operate 3-D printers varied, but multiple facilities had individuals holding certifications or certificates of completion of training in SOLIDWORKS, a leading software package for designing 3-D printing.

Data science was also mentioned in multiple interviews as an area in which workers sought to acquire skills and associated credentials. The manufacturing firms visited during the interviews varied in their data assets, with those using what appeared to be more modern equipment more likely to feel that they had data assets worthy of analysis in identifying opportunities for cost reduction or quality improvement. One firm boasted of a particularly impressive data dashboard through which it could track the precise cost of every component in terms of material and labor, and profit associated with each sale. However, this firm, which also had a resident data expert on staff, was the exception. More commonly, workers did not know where to find appropriate data science credentials. When pressed for ideas about which credentials one might consider, a worker mentioned that he would probably consider a certificate offering online instruction identified through a Google search.

Many workers also expressed strong interest in non-technical skills like those included in Figure 8. These skills were validated in interviews with supervisors, who also suggested these non-technical skills were important in their production workers.

Figure 8: Non-Technical/Workplace Skills Mentioned During the Interviews

- » Ability to learn from mistakes
- » Adaptability
- » Continuous learning attitude
- » Communication
- » Critical thinking
- » Leadership
- » Time management/planning ahead
- » Problem solving
- » Teamwork
- » Work ethic

WORKERS SEEK TRAINING THROUGH TRADITIONAL AND NON-TRADITIONAL PROVIDERS

Workers expressed openness to training from many different types of training providers, including both traditional and non-traditional. Types of training providers mentioned in interviews included: community colleges, Original Equipment Manufacturers (OEM), on-the-job-training, YouTube, certification body exam preparation courses and books, in-house training, MEP Centers, and online providers. Many individuals had worked with several different types of training providers and online training. YouTube was also noted as a good resource for self-taught skills.

One type of training that was highly valued by both workers and employers was training provided by equipment manufacturers. This training often accompanied the purchase of a new piece of equipment, but it was also used for existing equipment that supervisors felt was not being fully utilized due to a lack of knowledge. One of the benefits to this type of training seemed to be that workers who participated in it obtained deeper knowledge of how they would need to use the equipment in their current role, which made it highly valuable.

One employee explains his training experience as:

“EACH SOFTWARE HAS THEIR OWN LITTLE NUANCES AND THAT KIND OF STUFF. SO, WE ACTUALLY WENT TO [COMPANY] AND WE ACTUALLY DID FORMAL, CLASSROOM-STYLE TRAINING... TO LEARN HOW TO ACTUALLY PROGRAM IT, AND USED A LOT OF THE FEATURES THAT WE WEREN'T EVEN USING. AFTER DOING THAT, WE REALLY AMPED UP OUR PRODUCTION ON THE [MACHINE].”

This direct connection between the training workers participate in and an almost immediate increased productivity is likely the reason why this type of training is so valued.

Types of training providers mentioned in interviews included:

Community colleges

Original Equipment Manufacturers (OEM)

On-the-job training

YouTube

Certification body exam preparation courses and books

In-house training

MEP Centers

Online providers

WORKERS HAVE LIMITED KNOWLEDGE OF WHICH CREDENTIALS ARE VALUABLE

Although somewhat counter-intuitive, while workers valued the credentials they had, knew which skills they wanted to pursue, and also had some knowledge about where they might seek out additional training or education, few workers were considering pursuing another credential. Only five frontline workers had a specific credential they were considering pursuing at the time of the interviews.

The interviews also uncovered that workers primarily relied on their supervisors or managers to recommend a credential for them to pursue. Workers seemed to have some knowledge about credentials held by their co-workers. However, these were the only two sources of information on credentials named by the workers in our interviews, reflecting their limited knowledge of where to seek out information on credentials, which also limits their knowledge about which credentials would be valuable to their career goals.

Employer interviews with supervisors and hiring managers also touched on common themes, and offered additional information on how credentials are being used in manufacturing.



INTERVIEW THEMES FROM EMPLOYERS

EMPLOYERS PREFER INDUSTRY CREDENTIALS, BUT SEE FEW IN THEIR APPLICANT POOLS

The overwhelming majority of the participating supervisors and hiring managers mentioned that they valued seeing individuals with credentials in their applicant pools, but that it was not a common occurrence. They revealed that relevant credentials signaled many qualities that they valued in applicants: interest in manufacturing, experience in a role, and relevant skills.

However, even those who strongly desired credentials when screening job applicants still wanted to verify those skills in their internal hiring process. One interviewee stated: “I think we're just kind of in that mode that, okay, great, you got certified. Now prove it.” This attitude reiterated that credentials were only one element that was valued in the hiring process, and that employers still wanted to see how the skills represented by that credential might be applied in a particular role and/or industry.

“I think we're just kind of in that mode that, okay, great, you got certified. Now prove it.”

Additionally, an employer’s personal experience with the issuer of a credential was an important part of valuing that credential. Multiple employers mentioned they trusted training providers they knew, or organizations they were familiar with, more than others. Credential issuers they trusted included certification bodies, equipment vendors, and community colleges.

EMPLOYERS STRUGGLE TO TRACK EMPLOYEES’ CREDENTIALS

Overall, employers lacked knowledge of their employees’ credentials. At one extreme, we interviewed two individuals at one facility with several credentials, despite being told by the facility manager that none of the workers there had any credentials. At the other end, one manager stated that they had notes on all the training and

credentials for each of their employees. Most employers fell in a middle ground, however, where they tracked safety training for their employees to meet regulatory requirements, but had limited knowledge of other training or credentials for their employees.

For those who did track credentials and training, the most common approach was use of a spreadsheet. This approach seemed to meet the management and reporting needs of the facilities that used it, but it might not be manageable at larger facilities. Even for smaller employers, these spreadsheets are unlikely to contain a skills profile for each employee, which can be valuable to employers to understand which skills an employee has mastered, regardless of their current role. Skills profiles can be particularly helpful when there is a skills gap—perhaps due to an unexpected absence that needs to be filled quickly—as it allows employers to easily see which employees' skills would best fill the needed position.

More broadly, if spreadsheets are a typical approach to tracking skills, training, and credentials at small- and medium-sized manufacturing facilities, it exemplifies the lack of capacity for these types of employers to participate in education technologies like digital credentials, which are becoming more common at higher education institutions and large-sized employers. Digital credentials contain embedded information on what skills a particular credential represents, and are meant to be integrated into learning management systems and/or human resource information systems, but are not compatible with spreadsheets or other approaches that cannot process the meta-data from digital credentials.

EMPLOYERS HAVE LIMITED AWARENESS OF CREDENTIAL CONTENT

Supervisors and hiring managers interviewed had limited knowledge of the specific content of credentials, even those held by their employees, unless they themselves held the credential or provided training at their facilities for the credential. Therefore, many had knowledge of credentials like the Occupational Safety and Health Administration's (OSHA) Safety & Health Fundamental Certificate and Forklift Certifications, which are commonly held or required for many facilities, but were not familiar with many other types of credentials and what they represent.

For example, one hiring manager reflected on how they seek information for certifications they are not familiar with:

INTERVIEWER: DO YOU FEEL LIKE YOU KNOW ENOUGH ABOUT WHAT THESE CERTIFICATIONS ACTUALLY MEAN? WHAT ARE THE COMPETENCIES THEY REPRESENT?

INTERVIEWEE: NO, I DO NOT THINK I DO.

INTERVIEWER: WHERE DO YOU LOOK FOR INFORMATION, IF YOU ARE EVEN LOOKING FOR INFORMATION?

INTERVIEWEE: [I] LOOK IT UP ONLINE, JUST A GOOGLE SEARCH TO FIND OUT A LITTLE BIT MORE ABOUT IT.

This perspective is consistent with the previously described employer attitude that credentials were valued in the hiring process, but would not preclude the need for on-the-job training. As another supervisor commented:

HAVING THE CREDENTIAL AND HAVING THE SCHOOLING IS A GREAT WAY TO GET YOUR FOOT IN THE DOOR. BUT ONCE YOU'RE IN THE DOOR, THE BIGGEST TOOL IS ON-THE-JOB LEARNING... IT'S ONCE YOU'RE ON THE JOB AND LEARNING THINGS, THAT'S WHEN YOUR PRODUCTIVITY AND THE QUALITY OF YOUR WORKMANSHIP GOES UP AND YOU START TO REALLY LEARN HOW TO DO MORE THAN JUST WHAT YOU LEARNED IN SCHOOL.

This viewpoint suggests that manufacturing employers might find credentials to be a more effective part of the hiring process if they are specific to an industry or occupational role. However, increasing the number of credentials available amplifies the concern that employers are not familiar with the content of existing credentials.

EMPLOYERS RARELY SIGNAL VALUE FOR WORKERS' RECENTLY EARNED CREDENTIALS

Although the overwhelming majority of employers stated they valued credentials, they reported that formal recognition or rewards to workers for new credentials was rare. Only a few workers stated that a new credential they earned resulted with some sort of recognition, particularly if the credential was not linked to a promotion, including: pay increases at different levels in an apprenticeship program; pay increases for welders who had more advanced certifications; a pizza party recognizing the first individual at an organization to obtain a license; recognition from a senior leader at the company (personal congratulations and handshake); and a new set of tools to use in their role.

Most employers confirmed this practice, revealing that there was no formal policy for recognition or pay increases around credential attainment, even though the majority claimed that their facility management was supportive of training and credentials. Interestingly, the majority of the employers interviewed stated that the companies did pay for training or credentials for their employees, so it seems they were investing in their employees even if they were not recognizing the results of their own investments.

ADDITIONAL FINDINGS

CAPACITY CONSTRAINTS EXIST FOR FRONTLINE WORKERS FOR ONLINE/REMOTE TRAINING AT SCALE

As previously mentioned, this research was conducted during the COVID-19 pandemic, and the timeline was significantly impacted as interviews were challenging to schedule remotely. The reason for this became evident as in-person visits and interviews were conducted—manufacturing facilities have few, if any, personal computers or laptops available for frontline workers to use. All personal computers or laptops are used by management and support staff in their daily work.

For their regular course of business, this is a very reasonable decision, as these would be highly underutilized assets in the facility. However, when one considers the shift in training and learning for many institutions of higher education and companies to online and/or on-demand learning, this same decision becomes a significant capacity constraint for facilities to participate in this type of training. Individuals currently need to rely on their personal devices to participate, which may preclude certain types of training (e.g., training in new software) or delay training until computers or laptops are available.

LOCAL TRAINING PARTNERSHIPS DOMINATE

While not all employers had established formal partnerships with their local high schools, community colleges, or universities, all relationships mentioned during the interviews were with local partners. Supervisors were often very familiar with regional high school and relevant community college programs, both as potential sources for employees and as a resource for training. In a few cases, supervisors had worked with local community colleges to ensure that the programs taught skills relevant to their facility. Informal relationships were also exclusively with regional partners, including MEP Centers.

Certainly, employers indicated value for national certifications, but preparation for the assessments was typically done through a local or regional training partner—typically a high school or community college.

LOGISTICS/TRACKING SKILLS WAS A PART OF NEARLY EVERY WORKER'S ROLE

Although this may be, in part, a reflection of the industries that were involved in this research, logistics and tracking of individual components was prevalent throughout the facilities, involving nearly every production worker and supervisor. For example, nearly all facilities that tracked productivity did so through the throughput of a widget, meaning that every part of something being manufactured was tracked through every piece of machinery in the facility. Therefore, all workers on the production line, from quality control and inspection to shipping and receiving, were involved in the logistics of the facility.

While it was not the primary focus of the majority of these workers' roles, logistics and tracking skills are critical to almost all jobs in manufacturing facilities. This data certainly suggests that education and/or training programs for entry-level jobs in manufacturing should include basic logistical concepts.



DISCUSSION

NO CLEAR SOURCE OF INFORMATION FOR CREDENTIALS

There is clearly a need for additional information for both employers and workers to learn about credentials that meet their needs. Currently, these two groups seem to rely on their previous experience with credentials, word-of-mouth, and internet searches for their knowledge.

Given the breadth of the roles and industries encompassed by the manufacturing sector and the equally large number of credentials spanning these roles and industries, there is a role for accreditation or other clear markers of quality to make credentials more efficient in hiring practices. At a minimum, there is a significant need to educate supervisors and hiring managers about the value of existing accreditation processes for certifications and certificates, as well as the validation processes of registered apprenticeships by the U.S. Department of Labor Office of Apprenticeship and recognized State Apprenticeship Agencies.

REMEMBER THE SELF-SELECTION BIAS

Finally, as discussed in previous sections, the selection process through which these interviews were solicited (convenience group) probably means that the facilities that are more likely to value and use credentials were more likely to participate. Therefore, when interpreting these results, any attempt to generalize them should consider that of the use of credentials in manufacturing is likely to be worse than the data reflects. For example, record keeping for skills and credentials may be overrepresented in this study, or employers may be recognizing credentials even less than these results report. On the positive side, this means that the findings may have an even larger impact than suggested by the data reported here.

INTERVIEW CONCLUSIONS

Overall, this research yielded numerous insights into the use and value of credentials in manufacturing, with a particular focus on how credentials are selected by individuals and are recognized by employers. The interviews revealed a strong value for credentials in manufacturing by both workers and employers. The research also reflects a gap in knowledge about how to find valuable credentials and use them more effectively in hiring and promotion, as well as a commitment from employers and workers to continue training/education to keep skills current.

And even though a convenience group was used in this study, the results are consistent with the existing literature on manufacturing credentials. Furthermore, the same themes were identified from individuals in different facilities, geographic locations, and industries, increasing confidence that these results are accurately reflecting the views of credentials in small- and medium-sized manufacturing facilities throughout the United States.



PART 3 RECOMMENDATIONS



RECOMMENDATIONS TO SUPPORT A MORE HIGHLY SKILLED AND EFFICIENT MANUFACTURING WORKFORCE

The interviews conducted for this research study—with workers/credential holders, supervisors, and hiring managers—offered tremendous insight into the use of credentials in manufacturing facilities in the United States. They also provided an evidence base to develop the following recommendations in support of a more highly skilled and efficient manufacturing workforce.



RECOMMENDATIONS FOR MANUFACTURING FACILITIES

During the interviews, both workers and employers expressed that they value credentials. In particular, employers found them to be a valuable tool for signaling technical skills. In order to further leverage and increase the use of credentials in manufacturing facilities, we propose three recommendations that can improve hiring and promotion.

#1: Capture formal and experiential training with a credential

Both employers and workers strongly agreed that workers were regularly exposed to formal and/or experiential training in their current roles. While some of this training is captured to meet compliance requirements, much of this training is not formally recognized with a credential, which increases the need for every employer to invest in and conduct training for new employees.

Instead, employers should strongly consider developing or using more formal credentials, such as digital badges and/or microcredentials, to recognize the training they conduct. Competencies can be embedded in these types of digital credentials, which provides more transparency about the skills represented by the credentials as well as information about the issuer, and can increase the ability of workers to signal their skills. Furthermore, compared with most other credentials, digital badges

and/or microcredentials are an inexpensive and easy approach to provide workers with a credential that signals their skills. This is because employers can work with a local partner to develop and issue a badge or microcredentials, or issue a credential themselves by working with a digital badging platform.

In addition, employers should facilitate their employees' capacity to earn external credentials like certifications and assessment-based certificates as appropriate, which would allow workers to leverage the labor market value of an established credential, as well.

If implemented at scale, these practices would result in a more credentialed manufacturing workforce and make hiring more efficient. It would also allow employers to reduce new employee training costs by allowing for more tailored training based on the credentials and skills workers already hold when starting a position.

#2: Clearly signal the credentials/skills valued in hiring and promotion

Employers should more clearly signal the credentials and skills they value in hiring and promotion through transparent job descriptions. This will better support workers through two approaches.

First, it will provide clear guidance on the set of skills that are needed for a specific job role to individuals who apply for a position, as well as those wishing to upskill or reskill to qualify for a position. For those already working in the manufacturing sector, it can facilitate finding new employment opportunities by focusing on the skills rather than the position title. And for those seeking to upskill or reskill, it provides a clear set of competencies to align with education and training opportunities. In addition, it provides guidance to select a credential that includes the necessary competencies.

Second, it will signal to regional education and training providers, as well as national credential issuers, the skills needed for a specific job role. This signaling mechanism is important, as too often education and training providers rely on a limited number of subject matter experts to identify which skills and credentials they need to teach/offer, which may not fully represent the skill needs of small- and medium-sized manufacturers. If employers clearly signal the skills and competencies they value in

job descriptions, and regularly update them, credential issuers will have a trusted source from which to get this information.

Support may need to be provided for employers on how to write competencies into job descriptions to effectively provide this signal, however. Employers often create job descriptions that include tasks and responsibilities; they may need some guidance on shifting to create job postings that focus on the competencies needed to successfully accomplish those responsibilities (in addition to the responsibilities).

#3: Increase the use of accreditation or other markers of quality credentials

Employers were clear that there is no value in credential transparency without trust in the credential issuer. Higher education institutions have accreditation processes at the institutional and program level, and have a reputation for quality (or not) within their communities.

However, employers seemed less familiar with accreditation standards for certifications and other credentials issued outside of the higher education system. If these markers of quality were more readily available and better understood, it could significantly increase trust in non-degree credentials in manufacturing, and could facilitate employer's hiring and promotion processes.

Employers should work to increase familiarity with accreditation standards and practices for non-degree credentials, which will increase their trust that individuals holding these credentials are likely to be qualified for positions aligned with those credentials.



Having a competitive, robust, skilled manufacturing workforce is critical to maintain U.S. economic competitiveness. Credentials are an important component in attaining this goal, as they improve the effectiveness of hiring, training, and promotion in the workforce. Policymakers can support a highly skilled, well-credentialed manufacturing workforce by implementing the following three recommendations.

#1: Provide resources to offer workers impartial career advice

Workers currently have no reliable or consistent source for career advice in manufacturing. Given the critical importance of the manufacturing workforce in multiple industries, resources need to be identified to provide workers impartial career advice that prepares them for labor markets to enhance their sustainability and career mobility.

This career advice needs to include information about pathways and the skills, training, and/or credentials needed to advance along that pathway. Credentials and training opportunities should be screened for quality and fit for a career pathway, with a preference for including credentials and training opportunities that provide outcomes data on employment and wages.

Given the number of sectors and complexity of roles within manufacturing, a comprehensive guide may not be possible; however, for strategically important or critical industries, resources should be identified and/or developed to provide this targeted career advice.

#2: Offer more support for workers to earn manufacturing credentials

Currently, manufacturing workers are either self-funding credentials and/or relying on their employers to pay for credentials. While some of the facilities participating in this study paid for employees to earn credentials, they are typically looking for

training/credentials to meet immediate workforce needs. However, to develop a skilled and resilient manufacturing workforce, there is a need for financial support for workers to earn manufacturing credentials to not only meet current workforce needs, but also future needs as well.

Currently, for example, workers seem to be using creative, cost-free options to develop skills in 3-D printing and robotics. However, this ad-hoc approach is not likely to equip manufacturing workers at scale with the skills to support a competitive manufacturing industry in the United States. To accomplish that goal, workers need systematic support in obtaining credentials that meet both current and future skills demands. Funding and other resources (noted in other recommendations) are needed to support workers to gain credentials to maintain and increase the competitiveness of the U.S. manufacturing workforce.

Additionally, given the capacity constraints for virtual education/training that surfaced in our research, support for education/training should accommodate technological capacity at small- and medium-sized facilities. At a minimum, there should be a recognition by education and training providers in manufacturing that in-person training or courses will continue to be the preferred methods well into the future until these constraints can be decreased. Policymakers should consider making resources available to ensure that manufacturing facilities can benefit from remote or virtual training opportunities.

#3: Create a portal with information on quality credentials

Given the lack of information on quality credentials in manufacturing, both workers and employers would benefit from the creation of a portal of vetted credentials. The purpose of this portal would be to offer a list of manufacturing credentials that are relevant to manufacturing roles, meet a well-defined quality standard, and have publicly-available outcomes data on wages and employment.

This portal could be conceptually similar to the What Works Clearinghouse (WWC), which is managed by the Institute of Education Sciences within the U.S. Department of Education. The WWC is a trusted, evidence-based source that reviews research

and identifies which programs, products, practices, and policies meet their rigorous standards.

This credentials portal, along with the other recommended resources, would support manufacturing employers of all sizes by building their capacity to use, recommend, and support credential attainment for their workforce. It would also support workers by providing them with unbiased information and data about which credentials can support their professional goals.



RECOMMENDATIONS FOR FUTURE RESEARCH

The approach taken in this study revealed insights into the use of credentials, attitudes toward training, and capacity constraints of manufacturing facilities that went beyond the expectations of the research team. This approach—individual interviews, multiple viewpoints, on-site visits—is not commonly used in education and workforce research due to its resource-intensive nature, but it is our hope that researchers will incorporate more elements from this approach into their future studies.

As described below, this approach also yielded three additional research topics that should be further addressed.

#1: Identify effective approaches to tracking credentials and skills of workers

Research is needed to understand the specific needs of small- and medium-sized manufacturing facilities to track the credentials and skills of their workers. Many facilities did not track credentials, training, or skills unless required by regulations. However, several employers identified that tracking this information would improve their hiring, staffing, and training processes. Given the resources that are invested in these activities, insights from research in this area should result in important efficiencies for manufacturing employers.

Research is also needed to focus on the capacity of small- and medium-sized facilities to implement an effective tracking system. Considerations should include: benefits to employers from tracking skills, credentials, and training; resources needed

to implement and maintain a tracking system; benefits to workers from participating in this system; and how a system might be compatible with similar efforts in the workforce community in order to ensure manufacturing is not siloed.

It is worth noting that there are products available that support employers in capturing the skills of their employees and provide professional development of employees to meet the employer's needs. Once the needs and capacity of small- and medium-sized facilities are understood, existing products could be analyzed to determine whether they meet these needs or whether new products should be developed.

#2: Identify gaps in existing manufacturing credentials

While there are many existing credentials in manufacturing, there are also gaps in critical areas. For example, multiple employers mentioned the importance of such skills as communication, problem solving, critical thinking, and teamwork, for which there are no manufacturing-relevant credentials. A credential that could assess these skills in a context relevant to manufacturing workers would support employers and workers in hiring and promotion. There is also a lack of credentials available that signal skills in emerging technologies like robotics and digital twinning. Some of these skills may be integrated into existing credentials; however, others will require the need for new credentials to adequately achieve proficiency.

Research is needed in this area to better understand the landscape of existing manufacturing credentials and the gaps that exist between the skills assessed by the credentials and the skills that employers value. This research will also need to be forward-looking, examining how technologies being developed and implemented in large facilities might impact manufacturing processes at small- and medium-sized facilities. As manufacturing facilities continue to deploy new technologies, skills needs will continue to emerge and change.

Additionally, research is needed to better understand if and how small- and medium-sized facilities may have different credential needs. For example, the findings of this study suggest that additional generalist certifications (for multi-tasking employees) are needed in the small- and medium-sized manufacturing facilities to allow for more flexibility and efficient use of employees. This may also be the case for other manufacturing credentials or large-sized facilities.

#3: Invest in worker-centered research in manufacturing

There is a need for more worker-centered research to also understand their needs. One powerful component of this study was ensuring that the workers perspective on credentials was represented alongside the perspective of employers. While there were many areas of commonality among the workers and employers participating in this study, the unique perspective provided by workers on their value and use of credentials is central to promoting a more effective credentialing system in manufacturing. In particular, workers provide significant insight into their motivations for training and credential attainment, which can oftentimes be different than what employers are looking for or doing. Rather than focusing on the needs of only employers, finding a balance between the needs of both workers and employers is central to developing a more skilled manufacturing workforce.



FINAL THOUGHTS

These recommendations provide concrete steps that policymakers can take to ensure that workers have the information they need to convey their skills to employers; that employers understand the skills potential workers possess; that there is more relevant and easily accessible information about credentials and career guidance in manufacturing; and that workers and employers have access to information about the quality of credentials and the wage and employment outcomes associated with those credentials.

Understanding and investing in a highly skilled and competitive manufacturing workforce is critical to ensuring the economic health of the United States for centuries to come.



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- 16 Author's note: The quotes used throughout these reports have been edited for clarity.
- 17 Author's note: The skills included in Figures 7 and 8 were mentioned as part of the response to interview questions about which skills individuals were planning to seek out and/or which skills employers thought were important in the future.