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REGISTERED APPRENTICESHIP PROGRAMS SERVING INDIANA MANUFACTURERS: THE SPONSORS' PERSPECTIVE

WORKING PAPER

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Executive Summary

Since the Great Recession, US manufacturers have complained of a "skills gap": they cannot find enough skilled production workers. Despite uncertainty over the type of skills that are lacking and debate over whether the skills gap is a cyclical (subject to an eventual market correction) or structural phenomenon, policy makers at every level of government have developed numerous proposals to address it.

One current proposal is to expand apprenticeships. An apprenticeship is a structured job in which the employee receives both on-the-job training from an experienced professional and related classroom instruction. Compensation may increase as the employee acquires new and more advanced skills. Those who complete the training often receive a credential to verify competency. Apprenticeships may be registered (with the government) or unregistered.

To inform the current policy debate, the Manufacturing Policy Initiative (MPI) at Indiana University conducted a study (consisting of a self-administered survey and structured interviews) of sponsors of apprenticeship programs serving Indiana manufacturers and registered with the US Department of Labor. As the most manufacturing-intensive state in the nation and one where the skills gap is a top-level concern, Indiana provides an ideal location for such research. The survey and interviews were conducted from April 4, 2018 through June 8, 2018.

From the 211 registered apprenticeship programs (RAPs) in the state that serve manufacturers, MPI received 95 completed questionnaires and conducted in-depth interviews with five. Major results were as follows:

- The skills gap is a prevalent and significant problem. 72% of respondents report great difficulty in finding and securing skilled production workers. And 96% of respondents indicate that "meeting the organization's demand for skilled workers" is a "big reason" for sponsorship.
- Sponsors view their program positively. Nearly all respondents (97%) plan to continue their program. Implementation is not seen as especially bureaucratic nor complex. The most cited significant problem is when an apprentice resigns to take a position with another firm (i.e., poaching), as indicated by 29% of respondents.
- Sponsors are satisfied with the quality of related classroom instruction. The vast majority of respondents assess it to be either adequate (42%) or better than adequate (43%).
- 93% of respondents find current employees to be an "extremely effective" or "somewhat effective" recruitment mechanism. The next most popular recruitment mechanism, "high school," was identified as extremely effective or somewhat effective among 43% of respondents.
- Program success is most frequently assessed via completion and retention rates.

This research lends support to policy makers who wish to expand registered apprenticeships to a greater number of manufacturers to address the skills gap. However, policy makers should not ignore the role of non-registered apprenticeships and other work-and-learn programs, which many of the respondents to this survey also employ. Additional research to determine the prevalence and quality of these programs will be important information for manufacturers and policy makers alike.

Introduction

For millions of working-age Americans who lack a four-year college degree, the manufacturing sector represents a gateway to the middle class. This long-held perspective is undergoing a transformation. In the 21st century, new technologies and globalization of commerce have created a hypercompetitive environment—domestic manufacturers seek employees with an ever-higher skill set.

But attracting such talent has proven to be difficult in recent years. Since the Great Recession, US manufacturers complain of a skills gap: they cannot find enough skilled production workers (across all levels) to meet demand. It has become a top issue for manufacturers nationwide and in manufacturing-intensive states such as Indiana. According to Indiana Governor Eric Holcomb, ensuring Indiana has the workforce with the skills needed for the future is the defining issue for the next decade (Burton 2018).

One politically popular option to address the skills gap is through apprenticeship programs. An apprenticeship is a structured job in which the employee receives both on-the-job training from an experienced professional and classroom-related instruction. This "work and learn" model provides both practical and theoretical knowledge, which is seen to be critical across many skilled trades. In registered apprenticeship programs, the compensation of an apprentice increases as new and more advanced skills are acquired, and those who complete the training receive a nationally recognized and portable credential, known as a journeyperson's card, to verify competency in particular skills.[1]

In the United States, apprenticeship programs can be registered with the federal Department of Labor (DOL) in accordance with the 1937 Fitzgerald Act (USC 1937). A sponsor—which can be an employer, employee association, organized labor organization, or even an academic institution—must adhere to certain minimum standards outlined in DOL regulations and report regularly to the government entity that is responsible for managing the program in a particular state. Minimum standards include: organized instruction in technical subjects required for the occupation; proper supervision for on-the-job training; adequate facilities for training; periodic evaluation of apprentices' progress; maintenance of records; no discrimination in selection, employment, or training; and a progressively increasing schedule of wages. A DOL nationally recognized credential is awarded to apprentices who successfully complete the program.

A registered apprenticeship program (RAP) offers certain governmental benefits for employers (the possibility of tax credits, access to federal resources to reduce program cost, and certain regulatory advantages) and employees (increasing salary schedule, college credit, a nationally recognized credential upon completion).

[1] A journeyman is a worker who has achieved an acknowledged intermediate level of skill in a particular trade.

[2] On July 18, 2018, the U.S. Department of Labor announced the availability of $150 million to support sector-based approaches to expand apprenticeships on a national scale in key industry sectors. According

According to the US Department of Labor (2018), in FY 2017, 533,000 apprentices were enrolled in more than 22,000 registered programs across the United States, with 190,000 new apprentices and 64,000 completers. Of this national total, Indiana had 945 registered apprenticeship programs, with 17,323 apprentices, including 8,161 new apprentices and 3,342 completers.

Currently, policy proposals have been offered at the federal and state levels with the expressed purpose of expanding apprenticeships:

- President Trump issued an executive order to expand apprenticeships and set up a task force to make recommendations. Under the direction of Secretary of Labor Acosta, the task force issued its policy recommendations in May 2018. And in July 2018, the US DOL announced additional funding for states to expand apprenticeships.[2]
- Bipartisan legislation (H.R.6099/S.3061) has been introduced in both chambers of Congress to expand registered apprenticeships by authorizing funding for apprenticeship hubs (i.e., organizations that bringing candidates and sponsors together).
- In its last legislative session, the Indiana legislature considered multiple proposals to expand workforce training, without resolution. The issue is expected to resurface in the upcoming legislative session (Burton 2018).

To inform this ongoing policy debate, the Manufacturing Policy Initiative (MPI) in the School of Public and Environmental Affairs (SPEA) at Indiana University undertook a study of sponsors of registered apprenticeship programs serving Indiana manufacturers. The study consisted of a (1) a self-administered survey of all such sponsors, and (2) structured interviews with five sponsors representing a cross section of programs. Understanding the perspective of sponsors is critical as policy makers grapple with how best to expand apprenticeships and other work-and-learn programs to address the skills gap. As the most manufacturing-intensive state in the nation[3], Indiana is an important location for such a study.

[2] On July 18, 2018, the U.S. Department of Labor announced the availability of $150 million to support sector-based approaches to expand apprenticeships on a national scale in key industry sectors. According to DOL, the grants will "move a step closer to President Trump's vision set forth in Executive Order on Expanding Apprenticeship in America, which calls for increasing the number of apprentices in the U.S. across all industries."

[3] Indiana has the highest percentage of its workforce in manufacturing, and the highest percentage of gross state product associated with manufactured goods. Sources: DOL Bureau of Labor Statistics and DOC Bureau of Economic Analysis.

Literature Review

Is There a Skills Gap?

Since 2009, the number of job openings in the manufacturing sector has been growing while the much lower number of new hires has held steady; national surveys of manufacturers sponsored by The Manufacturing Institute and Deloitte consistently reveal this trend. Their 2015 survey led the authors (Giffi et al. 2015) to conclude, "Over the next decade nearly 3½ million manufacturing jobs likely need to be filled. The skills gap is expected to result in 2 million of those jobs going unfilled." In recent years, data show a large and persistent gap between the number of job postings and new hires in the manufacturing sector.

Other lines of evidence, however, do not reinforce the presence of a nationwide, persistent skills gap across manufacturing. For example, wages are not rising as they would if a skills gap exists. And longitudinal surveys of plant managers in manufacturing do not indicate labor shortages as a major factor for factories operating below capacity. In a 2016 nationwide survey of manufacturers, Weaver and Osterman (2017) determined that three quarters of manufacturers do not show signs of hiring difficulties. Of those that do, the greatest hiring problems are found in establishments that are members of clusters or demand highly specialized skills. Bonvillian (2018) opined that the manufacturing skills gap is more pronounced in occupations with higher skills (e.g., engineers and scientists) and becomes less acute in lower skilled occupations (i.e., skilled and unskilled production workers).

Kimmel and Martin (2015) provided a thorough synopsis of the conflicting evidence; they prefer the term, "training gap," over skills gap, and argue that the gap could become more severe in the near future as the baby boomer generation retires.

The nature of any skills gap is also important to discern. For example, is it due to fewer job applicants, a lack of qualified job applicants, and/or a reluctance by manufacturers to train new hires? If applicants lack needed skills, what exactly are the skills that are needed? Are these educational skills (i.e., obtained through the public education system), occupational skills (i.e., obtained through trade schools or by employers), or employability skills (e.g., having a strong work ethic, being a team player)? Lerman (2013) pointed out that all three categories of skills are important for middle skill jobs, such as skilled production workers in manufacturing.

What is the Role of Apprenticeships?

Expanding use of apprenticeships is seen by many policy makers (including the Trump Administration) and some academics (e.g., Lerman 2015) as a promising strategy to address the skills gap. Although it is an old concept—spanning back to ancient Babylon—the apprenticeship model is consistent with modern science reflecting how individuals learn (Borham 2004, Resnick 1987, Steedman et al. 1998).

Today, apprenticeships are prevalent around the world, most commonly in Central Europe (Austria, Denmark, Germany, Switzerland), where 40%-70% of youth enter an apprenticeship (Lerman et al. 2009). Apprentices make up 4% of the total workforce in Germany and Australia; the comparable US figure is far lower, at 0.3% (Lerman 2013). One reason for this disparity: a higher proportion of high school graduates go on to college in the US. In Germany, more high school graduates choose vocational training over college (*Financial Times* 2017), in part because its educational system places students into separate educational tracks as early as age 10 (Lazear and Janssen 2016). Others (Symonds et al. 2011) have drawn a similar conclusion: the US does not support judging a student's future potential at such a young age and a vocational track is perceived to be less prestigious than a college preparatory track.

Economists have long suspected that apprenticeships may be under-provided by firms acting in their own self-interest. Becker (1975) argued that firms will undersupply skills training of a general nature due to the possibility of poaching by other firms once the training has been provided. However, as other economists (Acemoglu and Pishke 1999, Bassi and Ludwig 2000, Holzer and Lerman 2009) have observed, employers often do provide such training, perhaps to overcome friction in the labor market.

Lerman (2013) identified, from the perspective of employers, major categories of costs (including wages, wages of trainer specialists for the time to train an apprentice, materials, and the cost of space) and benefits (including savings from a reduction in future hiring and training, lower turnover costs, and enhanced productivity) to employers who sponsor apprenticeships. In a later paper, Lerman (2014) assessed the pros and cons of apprenticeships using empirical data from several countries including Germany, Switzerland, Canada, and Australia. Included among the pros: apprentice production contribution outweighs costs; enhanced innovation; and lower employee recruitment costs. Among the cons: employer perception of weak returns due to poaching; some estimates show modest return on investment; and uncertain quantitative gains in the long-term.

Helper et al. (2016) examined thirteen businesses from various occupations and industries to determine motivations, costs, benefits, and apprenticeship alternatives to workforce development. The programs analyzed varied in time and cost (1-4 years; $25,000-$250,000/apprentice) and included some manufacturers, such as Siemens, Oberg Industries, Hyperthem, and MTU America. Benefits were measured using three types of metrics relating to production (output, post-apprenticeship productivity, error reduction), workforce (turnover rates, skill matching, recruitment costs, manager development), and soft skills (employee loyalty, problem solving, supervision requirement). The goal of the report was to provide a starting point for employers looking to calculate their own return on investment of apprenticeship programs by providing metrics and a procedure to follow. According to their analysis of company records, the researchers concluded that the benefits of apprenticeship to these firms were greater than the firms realized.

What Have Prior Surveys of Apprenticeship Program Sponsors Found?

Two published studies (Lerman et al. 2009, Colburn and Jenkins 2015) utilized surveys to obtain perspectives of sponsors of registered programs. In the former study, the DOL Employment and Training Administration sponsored a multi-modal survey of a nationally representative sample of RAP sponsors, drawn from a sampling frame that included 90% of all RAP sponsors. Sponsors identified as manufacturers constituted 18% of the sample frame, and 17% of the sampling frame had no known industry classification. Conducted via phone, fax, and internet in March and April 2007, the survey had a response rate of 71% (n = 947). Among the major findings (not specific to programs serving manufacturing):

- sponsors value apprenticeships highly and nearly all would recommend it to others;
- sponsors report generally high completion rates;
- current employees represent an effective source for recruiting;
- community colleges and public technical colleges support most of the related instruction component of the program, and the quality of instruction is rated highly;
- sponsors gave state agencies high marks for their assistance;
- sponsors have limited interaction with the public workforce investment system; and
- the two biggest drawbacks include poaching of apprentices from other employers, and the failure of apprentices to complete the program.

Colburn and Jenkins (2015) surveyed 400 sponsors of newly registered apprenticeships in the US (i.e., registered within two years of being surveyed). Their response rate was 10%; manufacturers represented more than half of the respondents. Sponsors indicated they were motivated by the need to secure qualified and productive workers in critical occupations; none were motivated by quantified cost-benefit calculations. Sponsors were not overly concerned with poaching and felt that it would not be a problem in the future. A primary challenge noted by 62% of the respondents was financing/funding, especially for smaller businesses. The registration process (including registering in multiple states having different processes) was seen as confusing and cumbersome by 42% of the respondents.

Our study fills an important gap in the literature. It provides up-to-date information from a high-quality mixed-methods study of registered apprenticeship programs in manufacturing in the most manufacturing-intensive state in the nation. Data from this study can inform policy makers and academics about the role of registered apprenticeship programs in filling the skills gap in manufacturing and areas of success and challenges for the future.

Methodology

The study consisted of (1) a self-administered survey of Indiana sponsors of registered apprenticeship programs and (2) structured interviews with a subset of survey respondents. The survey questionnaire can be found in Appendix A. The interview instrument can be found in Appendix B.

The study was sponsored by the MPI at Indiana University. It was conducted by MPI with support from the Indiana University Center for Survey Research.

Survey

The target population included Indiana sponsors of registered apprenticeship programs serving manufacturers at the time of fielding. The respondent was any individual or individuals at the establishment knowledgeable about the registered apprenticeship program.

The sample frame was from the US Department of Labor (DOL) RAPIDS database.[4] From this list, programs serving manufacturers were identified based on NAICS code, occupational title, and sponsor name. If classification was in doubt, a program was included. Military and correctional facilities serving manufacturing were considered out of scope and excluded from this list. Efforts were made to verify contact information prior to fielding.

All of those organizations appearing on the resulting list (N=211) were sampled. It is unknown whether there is non-coverage of the target population through either a records error or infrequency of frame update, as these matters are handled by the DOL in its management of the RAPIDS database. The survey included all new programs added into the RAPIDS system after the initial request but prior to fielding.

All questionnaires were written in English. A number of survey questions were taken from existing surveys while others were developed for this study. The survey was extensively reviewed by substantive and survey research experts. The questionnaire was pretested with two sponsors prior to fielding to ensure sponsors would understand each question and to minimize confusion.

Data was collected via link to a web survey that was sent by email and/or via a paper questionnaire that was sent by postal mail. Web data collection was programmed in Qualtrics software; respondents were recruited by email invitation (where email address was available, N=143); and followed up with email, phone, and postcard reminders. Among sponsors in this email group, one establishment requested and received a paper questionnaire.

[4] Nationwide, the vast majority of registered apprenticeship programs serve the building and construction sector; the manufacturing sector represents the next largest share. Off the 945 registered programs in Indiana, we determined that 211 serve the manufacturing sector.

For those sponsors without an email address, N=68, a paper questionnaire was mailed via USPS, with phone and postcard follow-up. Among sponsors for whom we originally did not have an email address, one establishment requested and received an emailed Web survey link after providing an email address. Ten establishments received a second mailing of the paper questionnaire; nine by FedEx and one (with a post office box address) by USPS Priority.

The field period for collecting web responses was from April 4, 2018 through June 8, 2018; the field period for collecting mail survey responses was from April 9, 2018 through June 8, 2018.The number of completed responses was 95.

All study cases were assigned final outcome codes and dispositions per standard definitions (2016) of the American Association for Public Opinion Research (AAPOR), as follows:

Final Disposition Count (with AAPOR code in parentheses):

- Complete (1.1) 95
- Logged on, did not complete any items (2.1121) 4
- Breakoff with insufficient information (2.12) 2
- Nothing returned (3.19) 90
- Undeliverable as addressed (3.31) 6
- Vacant (3.3134) 1
- Ineligible/out of sample (4.1) 13*
- Total 211

*Thirteen respondents indicated that their organization was not a sponsor of a DOL registered apprenticeship program, and these responses were classified as ineligible and eliminated from the denominator of the response rate calculation.

The study response rate (per the AAPOR Response Rate 1 formula) was 48% (95/198); the response rate for the email group was 54%, and the response rate for the no-email group was 35%. This response rate is high compared to similar studies. Two of the co-authors (Smith and Belton) carried out personalized telephone and email follow-up with sponsors, which was crucial in obtaining this level of participation.

Human verification of the raw data counts was performed. Although there is no sampling error in a census, there are other sources of potential error in surveys, such as nonresponse and measurement errors. Care was taken in the development of the questionnaire and in its fielding to minimize error.

Structured Interviews

In addition to the survey, structured phone interviews were conducted with five sponsors in May and June 2018. The purpose of the interviews was to obtain more in-depth information than could be obtained in the survey. Each interview took approximately one hour and was conducted by one of the co-authors (Belton, Smith).

Interviewees were selected from those completing the survey and were chosen to ensure coverage of (1) programs with and without organized labor involvement, (2) programs with few (e.g, one) or many (hundreds) apprentices in the pipeline, and (3) programs offering a variety of occupational categories.

Interviewees were promised confidentiality; their name and organization would not be disclosed in the final report unless their consent was obtained. Notes were taken during each interview; interviews were not recorded. All interviews were completed in English.

Results

The following analysis is based on data from 95 survey respondents. Although our response rate (48%) is higher than privately sponsored surveys of registered program sponsors, we caution the reader that analyses could look different if those sponsors who did not complete the survey are different from those who did complete the survey on the survey measures of interest. Also, for some items, there was a limited amount of missing data and those respondents who did not answer are excluded from the analysis of that item.

Sponsors Affirm a Skills Gap

The survey results confirm the perception of a skills gap and the critical role that RAPs play to address it. Nearly all of the respondents (95%) have at least some difficulty finding and securing skilled production workers, with 72% indicating they have great difficulty (Figure 1). When given a list of one dozen reasons for sponsoring a RAP with a choice of "big," "medium," "small," or "not a reason", 96% of respondents indicated that "meeting the organization's demand for skilled workers" was a big reason. The next highest level of support was "provides a mechanism for quality training on company-specific equipment," which was identified by 49% of respondents.

Each of the five interviewees identified the skills gap as a significant problem. Each interviewee was told that "skills" could refer to educational, occupational, and/or "soft" skills. They were then asked which is most apparent when thinking about the skills gap. The answers varied. Three of the five sponsors identified occupational skills as the skill set in which their organization has the greatest demand. And two of those interviewed also identified as a problem the decline in public funding of vocational or technical education in high school. One plastics manufacturer indicated that passing a drug test was an issue for recruitment.

Figure 1. RAP sponsors perceive a skills gap.

Sponsors View Their Program Positively

Sponsors are generally satisfied with their program. When asked if their organization plans to continue the program, 97% answered in the affirmative.

One metric of satisfaction relates to completion rates (all of those interviewed indicated that the program's success is determined primarily by completion and retention rates); more than two-thirds of the respondents to the questionnaire indicated a completion rate of 60+% for apprentices starting out in the program over the past five years, with most (55%) indicating a completion rate of between 80%-100%. It is important to note that this question may underestimate completion rates. When given a list of reasons why an apprentice had not completed the program within the last five years, a majority of respondents (61%) indicated that "still working as an apprentice" was a main reason.

Sponsors were also satisfied with retention. Said one interviewee: "Once someone completes, they stay with the company. There has been a 95% retention rate since I have been here." Said another: "We justify the program by upskilling employees and retaining them for life. They don't leave once they complete."

As shown in Figure 2, administration and management of the program seemed to work well for most sponsors. Few respondents indicated a significant problem with paperwork/bureaucracy, including the application process (5%), registration (4%), managing the program (5%), or reporting requirements (7%). Each of those interviewed gave the DOL Office of Apprenticeships in Indiana high marks for working with them to create and manage their program. Said one interviewee, "Our coordinator in DOL (IN) has been very helpful in sending us examples and giving us the info we needed to get our standards approved and in working with Ivy Tech [i.e., the centralized community college system in Indiana]. DOL has been very supportive of our efforts." Said another apprenticeship coordinator: "Being a part of the registered program means I can network with my competition (DOL has an apprenticeship conference every 6 months). Helps to keep our training up to the level of the competition."

To explore the opportunity cost of RAPs, we asked sponsors how they would obtain skilled workers in the absence of their program. More than half indicated they would hire from the market, suggesting that their RAP is more effective than this more traditional approach to obtaining skilled workers. Interestingly, 23% responded that their organization would sponsor a non-registered apprenticeship program in the absence of their registered program.

Interviewees were circumspect about their options in the absence of the registered program. Said one: "If we did not have this registered program, our ability to retain quality journeymen would be diminished. Our decision to run our plant 24/7 and go to 12-h shifts would be harder to fill." Said another: "We would hire people and give them on-the-job training but not give them classroom instruction or a certification. I don't see that [the absence of a registered apprenticeship program option] as a real possibility though. We'd probably create a program if we did not have one." The apprenticeship coordinator at one large employer offered this observation: "We would re-skill laid off workers from another plant through our journeyman in-training program. But since these tend to be older workers who have many years in the system, they retire and don't stick around long once we give them new skills."

Table 1. What percent of those who started your registered manufacturing apprenticeship program in the last 5 years successfully completed the program?

Answer	*Response Rate*	*Count*
0-19%	19.1%	18
20-39%	2.1%	2
40-59%	11.7%	11
60-79%	11.7%	11
80-100%	55.3%	52
Total	**100%**	**94**

The Most Significant Problem: Poaching

Sponsors were provided a list of one dozen potential problems (Figure 2). For each, sponsors were asked to indicate if it was not a problem, a minor problem, a significant problem, or "I don't know". Poaching was most often rated as a "significant problem"(29%), followed by "federal financial incentives are insufficient or difficult to access," (19%) and "takes too long to produce skilled workers (for example, outdated time requirements)" (17%).

It should be noted that the list of problems did not include the skills gap or recruiting people into the program because these issues were explored in other questions.

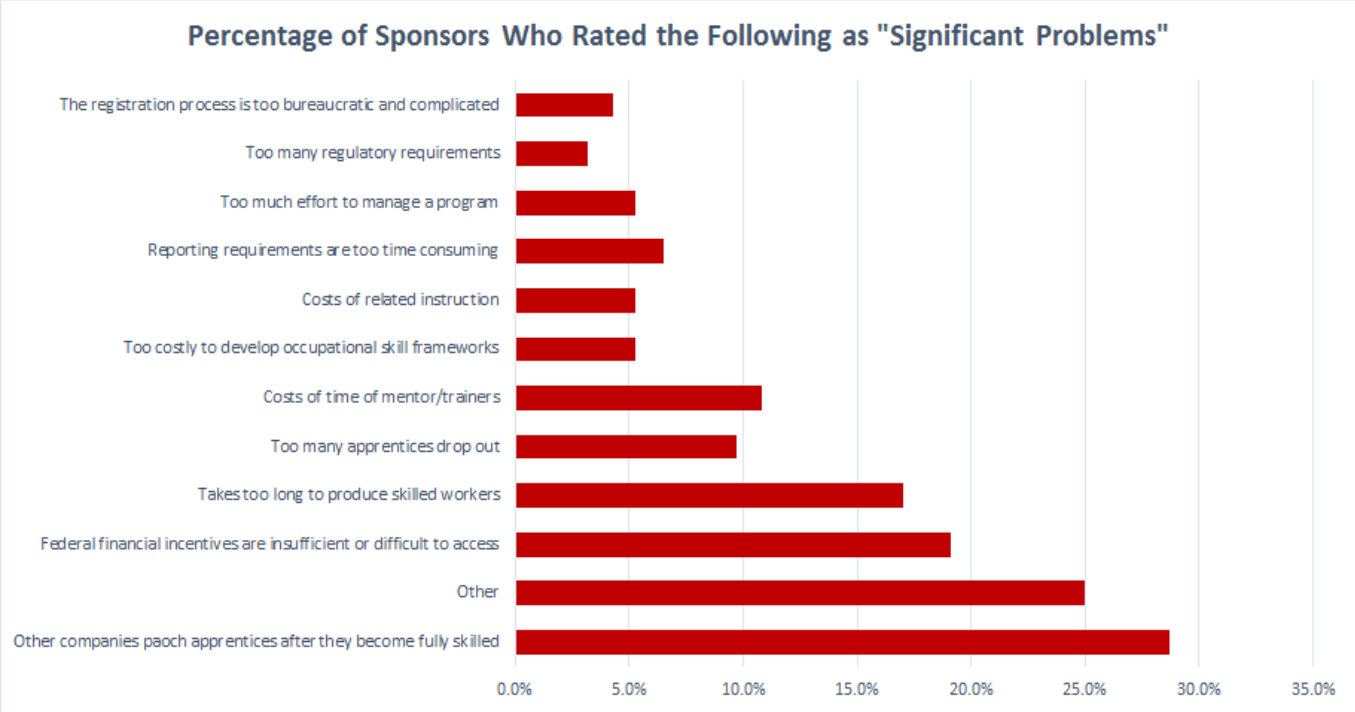

Figure 2. Significant problems with RAPs.

Most Effective Recruitment Mechanism: Current Employees

Sponsors were given a list of twelve recruitment mechanisms for attracting apprentices into their programs and asked to rate them as not effective, somewhat effective, or extremely effective. The mechanism that was most often rated as "extremely effective" was current employees (63% of respondents); no other mechanism had a similar level of support (Figure 3).

Interviewees of large programs often recruit from their pool of existing employees. Said one sponsor of a large program, "All of our recruits are current employees who are being

upskilled. We look for employees who have good soft skills, a good record of attendance, etc. We test them on mechanical and we interview them, too. Some of our employees already have experience working with equipment and troubleshooting, which is helpful." Said another interviewee, "We used to hire journeymen off the street. We would interview 100, maybe we would hire 20. And those people don't know robots or logic controls." Said a third, "Virtually all of our applicants are current employees. We only recruit externally when we cannot fill the positions from internal candidates. If we recruit internally we know their skills better."

About recruiting from high school, this is what one interviewee had to say: "Many high schools closed their vocational education programs. Those that remain have very poor quality teachers. Try to find competent teachers for a high school today—good luck! It ain't happening. We take from the one local high school that has a good vocational education program."

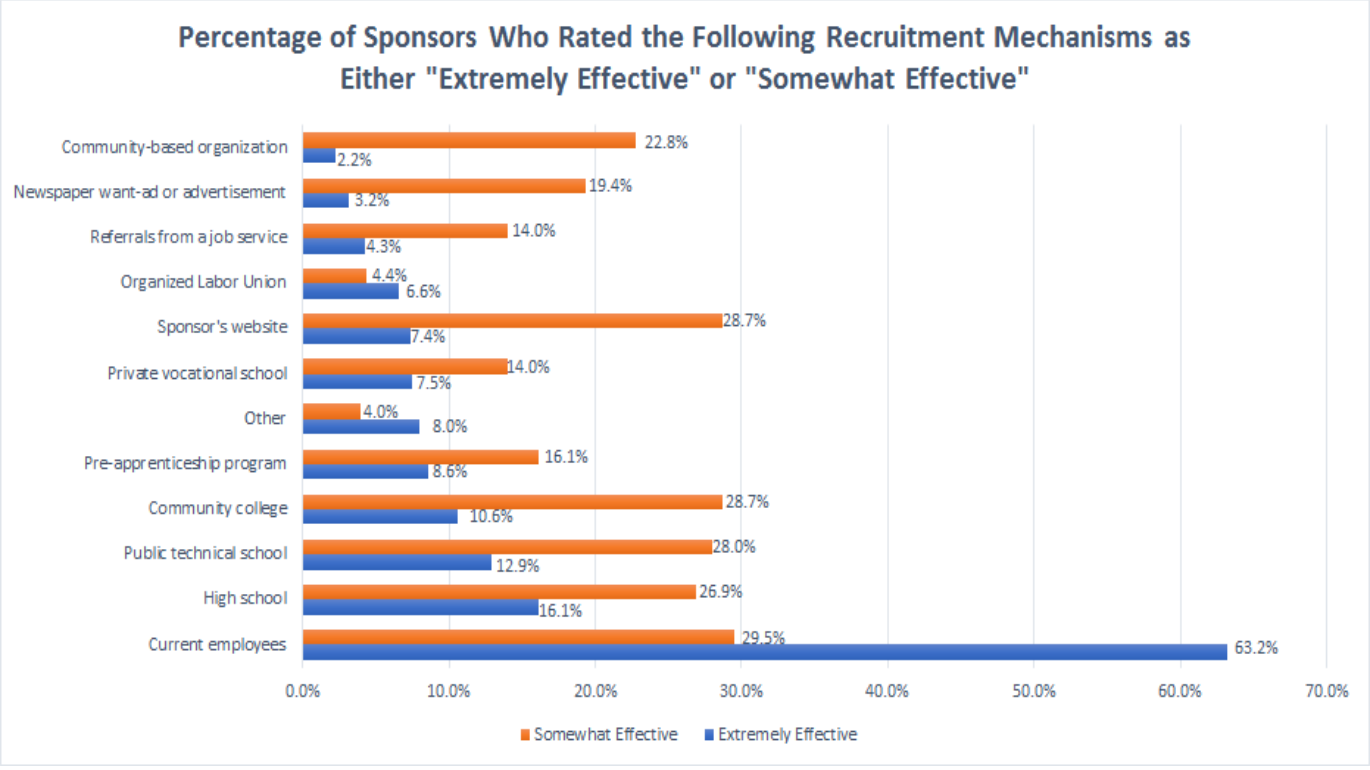

Figure 3. Most effective recruitment mechanisms for sponsors.

Related Classroom Instruction Seen as High Quality

Sponsors were asked three questions about the related classroom instruction component of their apprenticeship program: who supplies it, who pays for it, and what is the relative quality. Respondents indicated that the provider is typically a local

community college (52%) or public trade school (18%); that employers (98%) and to a lesser extent, employees (23%) pay for it; and that the overall quality of instruction is either adequate (42%) or greater than adequate (43%) (see Table 2).

Table 2. Rate your assessment of the quality of related instruction in preparing those who successfully completed the apprenticeship program in the past 3 years.

Answer	*Response Rate*	*Count*
Far less than adequate	8.7%	8
Somewhat less than adequate	6.5%	6
Adequate	42.4%	39
Somewhat greater than adequate	31.5%	29
Far greater than adequate	10.9%	10
Total	**100%**	**92**

No Discernible Differences among Types of Sponsors

Because of the limited number of responses, standard errors are too large to employ multivariate statistics to identify statistically significant differences between groups of respondents. A visual analysis of the results showed similarity in responses between sponsors with organized labor involvement and those without. We also classified results for sponsors serving one employer versus sponsors serving more than one employer. However, because we determined that some respondents misinterpreted the question (thinking that "number of employers" meant "number of employees" or "number of apprentices"), any comparison of these two groups of sponsors is likely to be unreliable.

In the future, we plan to explore differences between groups of respondents with a larger sample.

Discussion

In developing the survey, we deliberately chose to use many of the same or similar questions from a 2007 DOL-sponsored national survey (Lerman et al. 2009) of registered apprenticeship program sponsors. A comparison of results from both survey efforts indicates more similarities than differences. For example, results of the 2007 nationwide survey indicated that 83% of respondents indicated that the primary purpose of the program was to meet their demand for skilled labor (compared to 96% in this survey), 25% said poaching was a significant problem (compared to 29% in this survey), and 65% found current employees to be an effective recruiting mechanism (compared to 63% in this survey). Care should be taken in drawing conclusions here: the 2007 survey was nationwide and targeted all sponsors; the current survey covered just Indiana sponsors of manufacturing occupations.

The current survey explored the skills gap, an issue that was not acknowledged nor explored in the 2007 survey.

The Skills Gap

The skills gap is an omnipresent issue for manufacturers nationwide and in Indiana. Apprenticeships are thought to narrow this gap because they promote different types of skills. Respondents concur with this line of reasoning. Sponsors have great difficulty finding skilled production workers and say that the primary value of their program is to ensure a pipeline of such skilled workers.

To address the skills gap, sponsors utilize various approaches. Roughly 20% of respondents sponsor a non-registered apprenticeship program. Those interviewed for this study also employ other types of work-and-learn programs and incentives, including tuition reimbursement policies, internships, co-ops, and company-provided classroom instruction with respect to company-specific machinery and robots.

The interviews revealed aspects of the skills gap that individual employers cannot address on their own. For example, one machine shop owner noted a de-emphasis in recent decades on vocational and technical education in grades K-12. Even if school boards want to start such programs, finding qualified instructors will be extremely difficult.

The trend toward automation will also have an impact on the skills gap, and the impact may be positive or negative. One of those interviewed said that automation has lessened their organization's need for skilled labor. Others interviewed said that automation is requiring a different and higher set of skills from apprentices. There is support in the academic literature for both points of view; the impact of automation on the manufacturing workforce is not straightforward.

The questionnaire did not explore all the possible reasons for the a perceived skills gap, such as whether an employer is offering enough pay for individuals who possess the desired skills, or whether the plant location is in an area that has trouble finding skilled workers. Caution should be exercised in presuming that a perceived skills gap is due primarily to a lack of adequate training.

Several economic trends also shape the skills gap and are beyond the control of individual manufacturers. These trends include the historically low labor force participation rate, the current low unemployment rate, and the ongoing retirement of the baby boom generation.

Upskilling

As new technology changes the nature of work, lifelong learning has become a mantra. Upskilling is increasingly considered necessary for most careers, including those in manufacturing.

According to the questionnaire results, most sponsors find that recruiting through current employees is extremely effective. And according to those interviewed, recruitment of existing employees into the apprenticeship program increases completion and retention rates, which is a primary indicator of program success. Combining these results suggests that upskilling of current employees is a promising recruitment strategy for sponsors with a large enough workforce.

This strategy, however, is not a panacea for expanding apprenticeships. Upskilling is not an option for manufacturers who must recruit externally (e.g., those with a handful of current employees, which is characteristic of the vast majority of US manufacturing firms). And as manufacturers seek ever-higher skills for apprentices, external recruitment becomes more difficult. Upskilling also does not solve the cultural problem of attracting more young people into manufacturing, a challenge acknowledged in the interviews and consistent with national surveys of manufacturers.

Non-Registered Apprenticeship Programs

We know little about apprenticeship programs that are not registered with the government. Are there more apprentices in non-registered programs? Are non-registered programs more prevalent in certain industries or occupations? We don't know. Nor are there any data or research to determine the degree of equivalence between non-registered and registered programs. Are non-registered programs available for the same occupational title? Are credentials issued? Do credentials signify the same level of skill? Do employees perceive a difference in benefits between the two types of programs?

Interestingly, 22% of questionnaire respondents indicate that their organization also sponsors a non-registered apprenticeship program. This finding raises some interesting questions: How do sponsors define a program as an "apprenticeship"? Why might

sponsors employ both types of apprenticeships? Why would a sponsor choose to employ one over the other? Some respondents (23%) indicated that if their registered program did not exist, they would create a non-registered (or work-and-learn) program.

Answers to these questions are critical to current policy debate. If non-registered apprenticeships are prevalent and working well, what is the justification for registering a program with the government? If there is a government role, what should be the goal? To expand just registered apprenticeship programs, all apprenticeship programs, or all types of work-and-learn programs? Are all apprenticeship programs or all work-and-learn programs equally effective to address the skills gap? Manufacturers utilize those approaches that fit their unique circumstances. Understanding these circumstances is important for policy makers who want to offer solutions to address the skills gap.

Conclusion

This research lends support to policy makers who wish to expand registered apprenticeships to a greater number of manufacturers to address the skills gap. Indiana sponsors of registered programs serving manufacturers confirm that they have difficulty finding skilled production workers, that their RAP helps address this problem, and that they plan to continue sponsorship into the future.

Unlike the final report of the President's Task Force to Expand Apprenticeships, which was critical of the bureaucratic nature of registered programs, very few respondents to our survey indicated significant concerns about program complexity or implementation requirements. However, because each state manages their registered programs differently, the perception of Indiana sponsors cannot be generalized to sponsors in other states. It is also possible that those who did not respond to our survey have had a more negative experience with apprenticeship programs. However, we are unable to test for that possibility.

It might be expected that a survey of sponsors of currently registered programs feel positively about the program. Therefore, there is value in additional research to explore the reasons why some sponsors leave the registered program, or reasons why manufacturers choose not to register their program with the Department of Labor. Such research is more likely to identify perceived obstacles.

Policy makers should not ignore the role of non-registered apprenticeships and other work-and-learn programs, which many of the respondents to this survey also employ. Additional research to determine the prevalence and quality of these programs will yield important information for manufacturers and policy makers alike. The higher prevalence of apprenticeships in certain other countries (e.g., Germany) warrant exploration to identify specific policy and cultural differences of significance.

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Appendix A: Questionnaire Responses

Q1a Please provide your name:

Q1b Please provide your email address:

Q2 - Does your organization have an apprenticeship program registered with the Department of Labor that develops apprentices to work in the manufacturing sector?

	Answer	%	Count
	Yes	90.6%	96
	No	9.4%	10
	Total	100%	106

Q3 - Does your organization's program serve:

	Answer	%	Count
	One employer only	80%	76
	2-4 employers	10.5%	10
	5-10 employers	4.2%	4
	More than 10 employers	5.3%	5
	Total	100%	95

Q4 - Is organized labor involved in the sponsor's program?

	Answer	%	Count
	Yes	38.9 %	37
	No	61.1 %	58
	Total	100%	95

Q5 - Who pays for this registered apprenticeship program? Check all that apply:

	Answer	%	Count
	Sponsor(s)	68.2 %	73
	Government	6.5%	7
	Apprentice	6.5%	7
	Other, please specify:	18.7%	20
	Total	100%	107

Q6 - There are a number of different reasons why organizations might sponsor an apprenticeship program. Please indicate the extent to which each of the following were reasons that your organization sponsored this registered manufacturing apprenticeship.

Question	Big Reason		Medium Reason		Small Reason		Not a Reason		Total
Helps meet our organization's demand for skilled workers	95.8%	91	4.2%	4	0.0%	0	0.0%	0	95
Helps with employee recruitment and retention	46.8%	44	33.0%	31	10.6%	10	9.6%	9	94
Helps with employee retention	39.4%	37	44.7%	42	7.4%	7	8.5%	8	94
Reliably shows which workers have the skills to do the job well	34.0%	32	46.8%	44	11.7%	11	7.4%	7	94
Adds to productivity and/or high quality services	51.1%	48	37.2%	35	7.4%	7	4.3%	4	94
Saves money on worker pay	2.1%	2	14.9%	14	29.8%	28	53.2%	50	94
Good for worker morale/pride	43.6%	41	31.9%	30	18.1%	17	6.4%	6	94
Leads to fewer safety problems	22.3%	21	36.2%	34	23.4%	22	18.1%	17	94
Helps meet government requirements	4.3%	4	16.0%	15	20.2%	19	59.6%	56	94
Helps organizations meet licensing requirements	1.1%	1	14.0%	13	17.2%	16	67.7%	63	93
Provides a mechanism for quality training on company-specific equipment	48.9%	46	36.2%	34	10.6%	10	4.3%	4	94
Convenient way to retain specialized knowledge of older workers	31.6%	30	40.0%	38	13.7%	13	14.7%	14	95

Q7 - Is there some other reason that your organization sponsored a registered manufacturing apprenticeship that has not yet been addressed?

	Answer	%	Count
	Yes	11.0%	10
	No	89.0%	81
	Total	100%	91

Q8 - How much of an issue or problem are the following:

Question	Not a Problem		Minor Problem		Significant Problem		Don't Know		Total
Costs of related instruction	59.6%	56	31.9%	30	5.3%	5	3.2%	3	94
Costs of time of mentor/trainers	40.9%	38	47.3%	44	10.8%	10	1.1%	1	93
Takes too long to produce skilled workers (for example, outdated time requirements)	30.9%	29	51.1%	48	17.0%	16	1.1%	1	94
Too many apprentices drop out	59.1%	55	31.2%	29	9.7%	9	0.0%	0	93
Other companies poach apprentices after they become fully skilled	33.0%	31	31.9%	30	28.7%	27	6.4%	6	94
Too many regulatory requirements	66.0%	62	25.5%	24	3.2%	3	5.3%	5	94
Too costly to develop occupational skill frameworks and other information needed for registration	67.0%	63	25.5%	24	5.3%	5	2.1%	2	94
The registration process is too bureaucratic and complicated to understand (for example, requires registration with multiple states)	63.8%	60	28.7%	27	4.3%	4	3.2%	3	94
Too much effort to manage a program	50.0%	47	43.6%	41	5.3%	5	1.1%	1	94
Reporting requirements are too time consuming	62.4%	58	29.0%	27	6.5%	6	2.2%	2	93
Federal financial incentives are insufficient or difficult to access	33.0%	31	22.3%	21	19.1%	18	25.5%	24	94
Other problem not listed, please specify:	27.8%	10	0.0%	0	25.0%	9	47.2%	17	36

Q9 - If your organization did not sponsor this registered apprenticeship program, how would the employer or employers most likely acquire skilled workers? Choose only one response that best answers this question:

	Answer	%	Count
	Hire from the market (i.e., through a job posting) and train as needed	54.8%	51
	Offer training to existing employees to develop the missing skills	16.1%	15
	Develop a non-registered apprenticeship (work-and-learn) program	22.6%	21
	Hire individuals enrolled in another registered apprenticeship program	2.2%	2
	Other, please specify:	4.3%	4
	Total	100%	93

Q10 - What percent of those who started your registered manufacturing apprenticeship program in the last 5 years successfully completed the program?

	Answer	%	Count
	0-19%	19.1%	18
	20-39%	2.1%	2
	40-59%	11.7%	11
	60-79%	11.7%	11
	80-100%	55.3%	52
	Total	100%	94

Q11 - Of those who have not completed your program in the past 5 years, what is the main reason or reasons why apprentices did not complete the sponsor's program?

	Question	Yes		No		Not Sure		Total
	Transferred to another apprenticeship program	5.9%	4	80.9%	55	13.2%	9	68
	Gained craft license/took another job before completion	38.0%	27	57.7%	41	4.2%	3	71
	Problems with performance on the job or in the classroom	52.1%	38	42.5%	31	5.5%	4	73
	Personal issues (family needs, illness, drugs, alcohol, etc.)	34.8%	24	50.7%	35	14.5%	10	69
	Still working as an apprentice	60.6%	43	35.2%	25	4.2%	3	71
	Other, please specify:	37.5%	6	25.0%	4	37.5%	6	16

Q12 - To obtain applicants for its registered apprenticeship program, sponsors may use a variety of mechanisms. How effective were the following mechanisms to obtain applicants to your program?

	Question	Extremely effective		Somewhat effective		Not at all effective		Never used		Total
	Newspaper want-ad or advertisement	3.2%	3	19.4%	18	23.7%	22	53.8%	50	93
	Sponsor's website	7.4%	7	28.7%	27	11.7%	11	52.1%	49	94
	Referrals from a job service or a local One-Stop Center	4.3%	4	14.0%	13	14.0%	13	67.7%	63	93
	Community-based organization	2.2%	2	22.8%	21	12.0%	11	63.0%	58	92
	High school	16.1%	15	26.9%	25	9.7%	9	47.3%	44	93
	Community college	10.6%	10	28.7%	27	12.8%	12	47.9%	45	94
	Public technical school	12.9%	12	28.0%	26	16.1%	15	43.0%	40	93
	Private vocational school	7.5%	7	14.0%	13	11.8%	11	66.7%	62	93
	Pre-apprenticeship program	8.6%	8	16.1%	15	10.8%	10	64.5%	60	93
	Current employees	63.2%	60	29.5%	28	4.2%	4	3.2%	3	95
	Organized Labor Union	6.6%	6	4.4%	4	6.6%	6	82.4%	75	91
	Other, please specify:	8.0%	2	4.0%	1	4.0%	1	84.0%	21	25

Q13 - Which of the following organizations supplies the related instruction for the sponsored apprenticeship program?

	Answer	%	Count
	Community college - as part of a degree program	35.8%	34
	Community college - not as part of a degree program	16.8%	16
	Public technical college	17.9%	17
	High school	3.2%	3
	Proprietary trade school	9.5%	9
	Sponsor-owned or operated facility	2.1%	2
	Local nonprofit organization	4.2%	4
	Other, please specify:	10.5%	10
	Total	100%	95

Q14 - Rate your assessment of the quality of related instruction in preparing those who successfully completed the apprenticeship program in the past 3 years:

	Answer	%	Count
	Far less than adequate	8.7%	8
	Somewhat less than adequate	6.5%	6
	Adequate	42.4%	39
	Somewhat greater than adequate	31.5%	29
	Far greater than adequate	10.9%	10
	Total	100%	92

Q15 - Who pays for the related instruction component of the registered apprenticeship program?

	Question	Yes		No		Total
	Employer	97.8%	91	2.2%	2	93
	Apprentice	22.9%	16	77.1%	54	70
	Joint labor-management training fund	8.1%	5	91.9%	57	62
	Public funding (WIA, Pell grants, state aid, GI bill, etc.)	12.9%	8	87.1%	54	62
	Other, please specify:	12.0%	3	88.0%	22	25

Q16 - In recent years, which of the following statements best describes your organization's experience or the experience of employers linked to your organization?

	Answer	%	Count
	We have no difficulty finding and securing skilled workers	5.4%	5
	We have some difficulty finding and securing skilled workers	22.6%	21
	We have great difficulty finding and securing skilled workers	72.0%	67
	Total	100%	93

Q17 - Has your organization made any changes to its federally registered manufacturing apprenticeship program in the past 5 years to increase the number of workers you have with the skills you need?

	Answer	%	Count
	Yes	23.2%	22
	No	76.8%	73
	Total	100%	95

Q18 - If the answer to the previous question is yes, how has the sponsor altered its apprenticeship program? Check all that apply:

	Answer	%	Count
	Added or subtracted occupation(s) for which the sponsor offers apprenticeships	14.0%	7
	Changed recruiting to obtain more applicants	10.0%	5
	Changed recruiting to obtain better quality applicants	18.0%	9
	Changed the training for a particular occupation for which the sponsor offers apprenticeships	18.0%	9
	Changed the classroom instruction component	14.0%	7
	Changed the compensation or expected compensation of apprentices	20.0%	10
	Created a non-registered apprenticeship (work-and-learn) program to develop workers with the needed skills	4.0%	2
	Other, please specify:	2.0%	1
	Total	100%	50

Q19 - Are you currently contemplating alterations to the current apprenticeship program to better attract applicants, improve training of participants in the program, and/or retain program participants?

	Answer	%	Count
	Yes	31.9%	30
	No	68.1%	64
	Total	100%	94

Q20 - Does your organization plan to continue to sponsor its registered apprenticeship program?

	Answer	%	Count
	Yes	96.8%	91
	No	3.2%	3
	Total	100%	94

Q21 - Does your organization also sponsor an apprenticeship program or work-and-learn program that is not registered with the Department of Labor?

	Answer	%	Count
	Yes	22.1%	21
	No	77.9%	74
	Total	100%	95

Appendix B: Interview Instrument

We appreciate your willingness to share your insights and experiences regarding your apprenticeship program. Your input will be a very valuable part of our research.

As we mentioned, we are gathering information on the general characteristics and potential challenges associated with registered apprenticeship programs to help us better understand their value and to explore their role in addressing the demand for skilled production workers in the manufacturing sector.

Participation in the study is voluntary. You may refuse to answer any question or stop the interview at any time. In writing up the results, we will not reveal your name or your organization.

Do you have any questions?

Date and Time:

Length of Interview:

In-person or via phone?

Background Information on Interviewee:

We would like to start with some background information on you and your organization.

Name –

Sponsoring Organization –

Is the sponsor also an employer of those who complete the program?

Is the sponsor a union? Is organized labor involved in the management of this program?

Position –

Number of Years with Organization –

Number of years in your current role?

What is the name of your registered program (including occupational title)?

Can you tell us a little about the business or businesses served by this program? That is, which manufacturers are served by the program, which occupational title(s) covered by the program, and a description of the covered occupation(s).

How long has the registered program existed? Has it been registered with the DOL since its creation?

Why did your organization decide to register the program with the Department of Labor?

Please tell me about the program itself. What are the specific requirements to complete it? (How much classroom instruction? How many hours under the supervision of an experienced professional?)

What has worked well in recruiting people into the program?

How long does it take a person, typically, to complete the program from start to finish?

Who pays for the program and how much? The sponsor, the employer (if different) the apprentice? the government (directly or indirectly)?

Do you foresee any changes in the future with how the program is paid for and who pays for it? If so, please describe.

How many apprentices does the program currently serve? Over the past five years, what is the typical number of apprentices in the program at any one time? Is there some sort of seasonal variation or cycle to the number of apprentices entering into the program?

Perception of the Skills Gap:

The next few questions are about the so-called "skills gap".

Some manufacturers complain about a "skills gap;" they cannot find the skilled workers they need. Does your organization share this perspective, that there is a skills gap in the area of manufacturing that your apprenticeship program serves, or do you have a different view? Please tell me more.

If there is a skills gap, what kind of skills are we talking about? Educational skills—the kind you obtain in public school? Occupational skills—the kind you learn from an employer? Or "soft" skills, like showing up on time and being able to work in a team?

If, in your opinion, there is a skills gap, does the registered program help address the skills gap? Please tell me more.

Has the program been changed over time as the needed skills change for employers? How so?

Is your organization considering (additional) changes to the current program to address the changing needs of employers? If so, what kinds of changes? Please tell me more.

Apprenticeship Program Takeaways:

I'd now like to ask a few questions about how well the program has worked.

How successful would you consider the apprenticeship program to be? Please tell me more.

Can you share some particularly memorable stories or experiences of successes or challenges with the apprenticeship program?

How does your organization measure the program's success?

Does your organization measure the benefits and the costs of the program? If so, how?

What is the alternative to having this registered program? What would the sponsor (employer) do if the registered program did not exist?

How do you feel the program has benefited the sponsor (employer) compared to the alternatives? What benefits would the alternative(s) offer compared to the registered program?

Suggestions for Improvement:

Now we'd like to ask you a few questions about potential improvements to the program.

What are the biggest challenges for managing this registered program?

Have any steps been taken to addressing these challenges? Tell me more.

What kinds of support does your organization receive from the Department of Labor (if any) or the state of Indiana? Please describe. Do you feel the support meets your program's needs or not? Which area(s) would you like more support in?

Do you have any suggestions for how registered apprenticeship programs could be improved? Please describe.

Do you have any final remarks about the registered apprenticeship program? Is there anything we missed, or you would like to add?

Non-registered programs:

We also would like to ask a couple of questions about apprenticeship programs or "work-and-learn programs" that are not registered with the government.

Does your organization sponsor any non-registered apprenticeship programs? If so, how do these differ from your registered programs? Please describe.

Do you know why your organization decided not to register this program or these programs?

How successful would you consider this program(s) to be? Please tell me more.

Last Question:

Can we use your verbatim responses/actual words for quotes in our report?

Thank you very much.