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## **Cyclical Construction Workforce Shortage: An Evaluation of the Current Shortage in the Western North Carolina**

Ahmed Jalil Al-BAYATI<sup>1</sup>, Mohammadsoroush TAFAZZOLI<sup>2</sup>, David D. York<sup>3</sup>, and Tariq UMAR<sup>4</sup>

<sup>1</sup> Dept. of Civil and Architectural Engineering, College of Engineering, Lawrence Technological Univ., 21000 West Ten Mile Rd., Southfield, MI 48075. Email: [aalbayati@ltu.edu](mailto:aalbayati@ltu.edu)

<sup>2</sup> School of Design and Construction Management, College of Engineering and Architecture, Washington State University, Pullman, WA 99164; Email: [tafazzoli@wsu.edu](mailto:tafazzoli@wsu.edu)

<sup>3</sup> Providence Construction Group Inc., 224 S. Grove Street, Hendersonville, NC 28792; PH (828) 697-7017; email: [davidy@providencecc.com](mailto:davidy@providencecc.com)

<sup>4</sup> Lecturer, Department of Civil and Environmental Engineering, A'Sharqiyah University, P.O. Box 42, Ibra, Oman. email: [tariqumar1984@gmail.com](mailto:tariqumar1984@gmail.com)

### **ABSTRACT**

The inadequate supply of skilled construction craft workers is an issue that currently affects the performance of the construction industry. The performance of the construction industry has a significant influence on the growth of the national economy as well as citizens' wellbeing. The challenges associated with the construction industry's skilled worker shortage are cyclical. The cyclical nature is a result of the fact that the demand for construction in the U.S. depends on the performance of the overall U.S. economy. The current study evaluates the nature of the current shortage in the western region of North Carolina. Accordingly, the study examines the data collected by the Mountain Area Workforce Development Board, employing a survey that targeted construction firms. The authors have analyzed 46 completed surveys that were collected during the fall of 2018. Among other findings, the study reveals that the demand for laborers and licensed journeymen is higher than other construction positions such as supervisors and estimators. Also, the study shows that entry-level positions such as laborers have higher employee turnover rates compared to more experienced positions. The research could help develop a certified career pathway that provides short-term training and work-based learning opportunities for the raw construction workforce.

### **INTRODUCTION**

Construction and extraction occupations are projected to grow by 11% from 2016 to 2026, compared to an estimated growth of 7.4% for all industries (Bureau of Labor Statistics (BLS), 2018a). According to the BLS (2018b), the 2018 construction employment level is in excess of 7.4 million persons, which is similar to the level before the 2008 financial crisis; nevertheless, the industry is experiencing a shortage of skilled workers. A survey conducted by the Associated General Contractors of America (ACG) (2018) found that 80% of construction firms had difficulty finding qualified employees during 2018. The U.S. construction industry faces a shortage of

skilled workers for two primary reasons: (1) high demand for construction workers and (2) an inadequate supply of skilled trade workers (Albattah, 2016; Minooei, 2018). According to the Bureau of Labor Statistics, the construction industry unemployment rate is at its lowest point since 2000 while the number of job openings is simultaneously at its highest point since 2000 (BLS, 2018c; BLS, 2018d).

A significant imbalance between the number of skilled trade workers within the industry's labor pool and the number required to fulfill the industry's level of demand results in increased project cost and schedule overruns (ACG, 2019; Karimi et al., 2017; Karimi, 2017). Skilled labor shortages also have a significant negative impact on construction safety performance, which in due course results in escalating indirect cost (Karimi et al. 2016; Al-Bayati et al. 2017). The shortage of skilled labor in the construction industry is not a recent issue, but a cyclical issue. Numerous studies during the past several decades have documented the existence of skilled worker shortages in the construction industry (The Business Round Table, 1983; Construction Users Round Table, 2004; McGraw-Hill Construction, 2012; Construction Industry Institute, 2015). During extended periods of economic recession, the demand for construction decreases, which can cause the skilled labor pool to shrink as unemployed workers migrate to jobs in other industries. Meanwhile, periods of economic expansion increase the demand for construction activities and skilled workers. Thus, an extended or severe recession cycle followed by a period of economic growth will predictably result in a shortage of skilled construction workers (Albattah, 2016).

This paper evaluates the information obtained through a survey that was conducted by the Mountain Area Workforce Development Board. The survey responses were utilized to ascertain information regarding which skilled trade professions are the most difficult to fill, experience the most turnover, and are in highest demand. Also, information regarding the preferred credentials and wage ranges for skilled trades positions is collected and presented.

## **METHODOLOGY**

An online survey was developed by The Mountain Area Workforce Development Board in North Carolina. The survey targeted the skilled trades/construction firms in Buncombe, Henderson, Madison and Transylvania Counties. The survey consists of 16 questions that aim to support the development of a certified career pathway that will provide short-term training and work-based learning opportunities for graduating high school students, unemployed, and displaced workers. The following are a sample of the survey questions:

- Number of current openings (advertised or not advertised) October 2018-December 2018

- Number of anticipated future openings (January 2019 - December 2019)
- What are the most difficult positions to fill?
- What are the positions with the most turn-over?
- What credentials do you value or require? These can be company-based, or offered by a community college, training vendors, or professional credentialing organizations?

## **FINDINGS**

An online survey was distributed online among construction firms that were operating in the western Carolina area in fall 2018, and 47 responses (i.e., construction firms) were received. The types of firms that participated in the study were multi-trades (58.7%), carpentry (17.4%), heavy equipment operation (15.2%), and others such as electrical and plumbing (8.7%). Figure 1 shows the total hires by participating firms included the expected new hires in 2019.

The responses suggest that the need to hire new construction workforces will drop in 2019. This finding requires further investigation to uncover the causes behind the anticipated decrease in demand for construction workforces. The participants were asked about the current and future job openings within their firms. Figure 2 illustrates the title of current vacant positions (i.e., fall 2018) and the projected vacant positions (i.e., 2019) as well as their frequency within the study sample. The most needed positions in fall 2018 and the projected positions in 2019 were laborers, licensed journeymen, and high-level technicians, see Figure 2. While the most needed and projected positions are similar, there is a clear decline in the number of projected positions, which is consistent with previous finding.

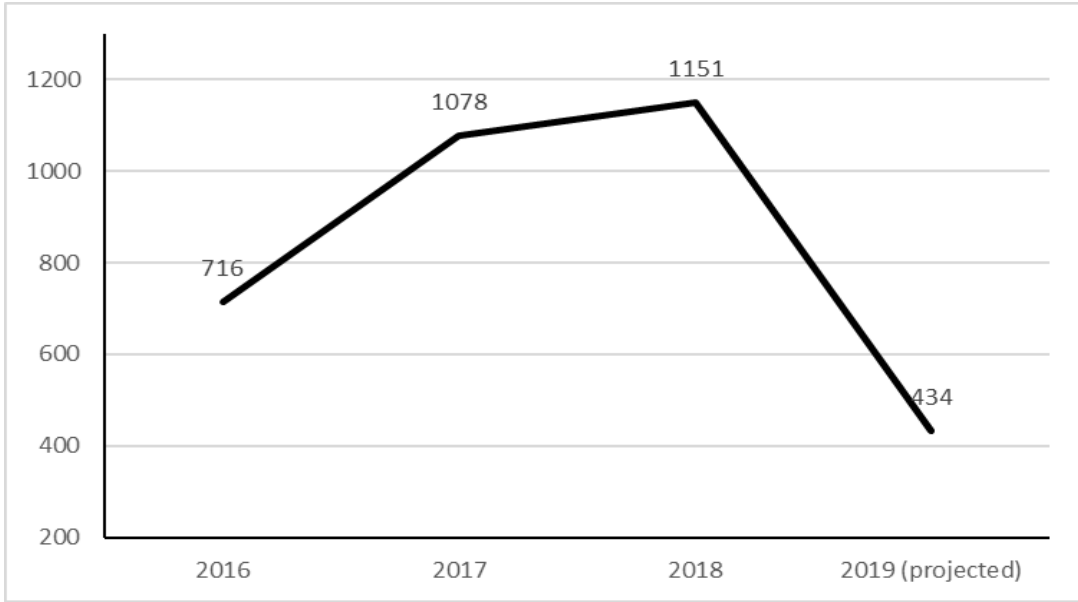


Fig.1. The Total Hires within the Study Sample 2016-2019

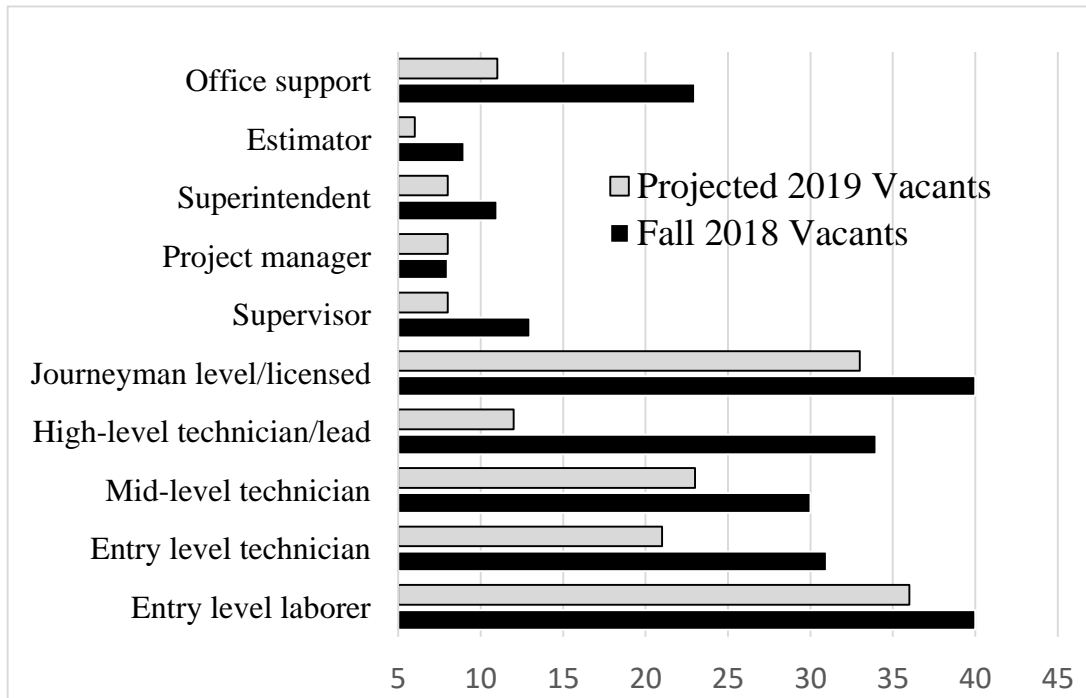


Fig.2. The Current and Anticipated Vacant Positions within the Study Sample

The respondents were also asked about the three most difficult positions to fill. The responses cover a wide range of positions with no specific position reported more than others. However, a question investigating positions with the most turn-over revealed that labor positions to have the most frequent turnover (i.e., roughly 20%).

The participants have been asked about utilizing high school diplomas and General Education Development (GED) or the National Career Readiness Certificate as a requirement or preference for hiring. The results indicate that 24 (52.15%) participants do not require a high school diploma or GED. In addition, only two (4%) indicate that they prefer the National Career Readiness Certificate to be carried by their new hires. The participants provided their preferences about services that could be provided by workforce partners, such as workforce development centers to better qualify job seekers, as seen in Figure 3. Among the six provided services, the participants score screening and referrals as the first service that would help them hire and retain construction workforces. Services also include basic skills testing, soft skills training, and personality testing. While there are not enough details about the components of these services, this identified need could be considered as a departure point for future studies.

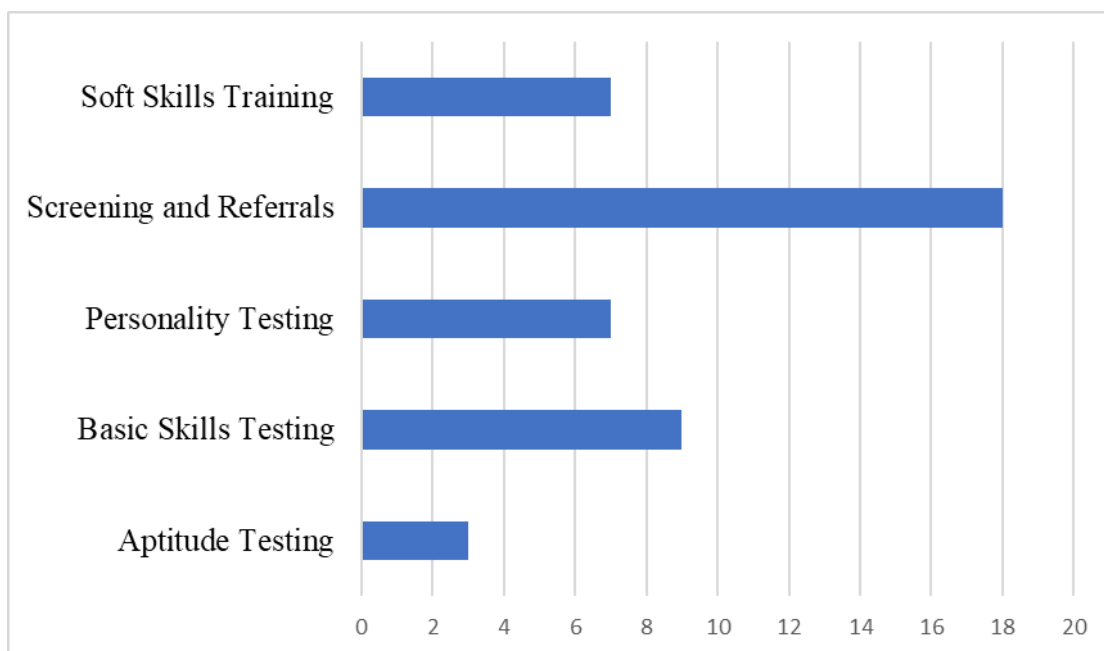


Fig. 3. The Services Needed to Improve Hiring Process

## DISCUSSION AND RECOMMENDATIONS

Individuals who participated in this study mainly represent small construction businesses, which was expected since 91.7% of US construction businesses are firms with fewer than 20 employees. According to Dickens (2019), skills shortages will continue in 2019 and likely beyond due to the retirement of the nation’s most experienced and skilled construction workers as well as the healthy construction environment (i.e., a high number of construction projects which leads to high demand

for construction workforces). However, spending on construction of buildings is no longer climbing (Dickens, 2019). According to the United States Census Bureau's (USCB) data (2019), the private spending on private residential construction in the first five months of 2019 is slightly lower than of the first five months of 2018, as seen in Figure 4. The census data is consistent with the projection of the study sample about the number of hires in 2019. However, the demand for construction workforces is still strongly existing. This study provides primary information about the trends of the current shortage as well as the possible remedies to overcome it. Understanding the nature of the current shortage would help the industry provide the needed tools to improve the overall shortage management.

The current study reveals that entry to mid-level personnel, including entry-level laborers, licensed journeymen, and technicians, are more needed than higher-level personnel, including estimators, superintendents, and project managers. Similarly, the study findings suggest that turnover often occurs among entry-level personnel such as laborers. This finding suggests the industry needs to focus on short-term training programs to fill the needed positions. According to Azeez et al. (2019), entry to mid-level personnel are often paid hourly. Hourly payment has been linked to lower job satisfaction and work security, which in turn lead to higher turnover (Narehan et al. 2014). Younger workers expect a lot from their jobs such as rewards, safe and healthful workplace, and resources (Shan et al. 2017). Thus, younger workers may not be interested in the construction industry because of high job intensity, dangerous working environment, and unclear career path (Francis and Prosser 2013).

The high school diploma and GED seem to be acceptable by roughly 48% of the study sample, which is adequate to fill most of their current need (i.e., mid and entry-level personnel). However, the results indicate that there is no firm educational degree required to fill entry and mid-level construction positions. Thus, apprenticeship programs could be the best approach to prepare construction workforces. However, it has been suggested that employers are unwilling to invest money in apprenticeship programs because there is no guarantee that workers will continue working with them (Wang et al. 2008). Thus, workforce development centers should take the lead in funding apprenticeship programs. Wang et al. (2010) found that apprenticeship programs reduce job turnover and improve productivity and overall site safety.

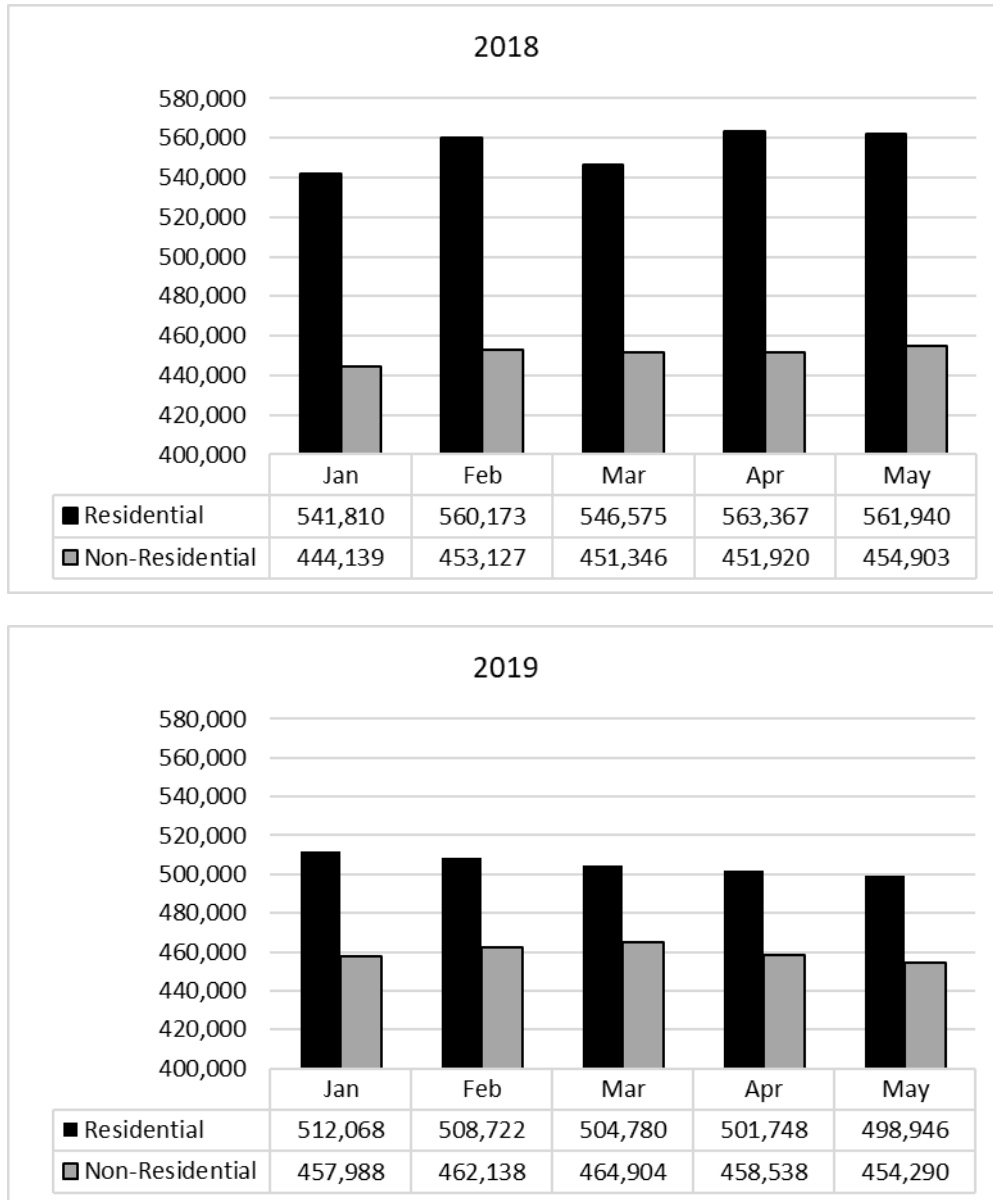


Fig. 4. Private Spending in Millions of Dollars (2018 Vs. 2019)

The needed services and training programs to improve the hiring process is the primary finding of this study; see Figure 3. Soft skills training would increase the capacity of potential construction personnel. Participants show their disappointment from the fact that many applicants do not have job interview skills and do not know how to fill out an application or respond to basic questions during an interview. Therefore, workforce development centers and similar entities should create soft skills training to help the industry as well as future construction personnel. Testing services are very crucial for an industry where most businesses hire fewer than 20



employees. Testing services include screening and referrals, basic skills, personality, and aptitude. There is a need to further investigate the components that need to be included with these services and training. Accordingly, the study recommends further research studies to identify the components needed to develop future construction workforces. In addition, establishing a testing services center that helps small construction firms would certainly help the industry improve the overall hiring process.

## CONCLUSION

A questioner was designed and administrated to support the development of the construction workforce in the western region of North Carolina. The findings suggest the current most-needed construction positions as well as training and services. The findings are useful to create a certified career pathway that will provide short-term training to qualify graduating high school students, unemployed and underemployed adults, and displaced workers to fill the needed positions. While the current workforce shortage is affecting all positions, the major challenge, this study reveals, is the shortage of entry and mid-level positions. These positions do not seem to attract the raw workforce, which required further investigation of possible remedies. The overall findings will develop a much-needed pipeline of construction workers. Accordingly, the information presented in this study will aid the industry in developing new employee recruitment and retention strategies, as well as individuals that are considering entering into a construction profession.

## REFERENCES

- ACG (Associated General Contractors of America). (2019). "US Construction Spending, Labor and Materials Outlook." [https://www.agc.org/sites/default/files/Files/Communications/Construction%20trends%20%26%20outlook\\_0\\_0.pdf](https://www.agc.org/sites/default/files/Files/Communications/Construction%20trends%20%26%20outlook_0_0.pdf) (Accessed February 2, 2019)
- AGC (Associated General Contractors of America). (2018). "Eighty Percent of Contractors Report Difficulty Finding Qualified Craft Workers to Hire as Association Calls for Measures to Rebuild Workforce." <https://www.agc.org/news/2018/08/29/eighty-percent-contractors-report-difficulty-finding-qualified-craft-workers-hire> (Accessed February 2, 2019)
- Albattah, M. A. (2016). "A Critical Analysis of the Structural Changes Related to Craft Demographics Influencing Craft Supply and Demand in the United States across Multiple Dimensions." *PhD Dissertation*, University of Colorado at Boulder

- Al-Bayati, A., Abudayyeh, O., Fredericks, T., and Butt, S. (2017). "Managing Cultural Diversity 348 at U.S. Construction Sites: Hispanic Workers' Perspectives." *J. Constr. Eng. manage.*, DOI: org/10.1061/(ASCE)CO.1943-7862.0001359
- Azeez, M., Gambatese, J., and Hernandez, S. (2019). "What Do Construction Workers Really Want? A Study about Representation, Importance, and Perception of US Construction Occupational Rewards." *J. Constr. Eng. Manage.*, 145 (7), 04019040, DOI: 10.1061/(ASCE)CO.1943-7862.0001669
- BLS (Bureau of Labor Statistics). (2018a). "Employment by Major Occupational Group." <https://www.bls.gov/emp/tables/emp-by-major-occupational-group.htm>. (Accessed February 2, 2019)
- BLS (Bureau of Labor Statistics). (2018b). "Employment, Hours, and Earnings from the Current Employment Statistics survey (National)." <https://data.bls.gov/pdq/SurveyOutputServlet>. (Accessed February 2, 2019)
- BLS (Bureau of Labor Statistics). (2018c). "Unemployment Rate - Construction Industry, Private Wage and Salary Workers." <https://www.bls.gov/iag/tgs/iag23.htm#workforce> (Accessed February 2, 2019)
- BLS (Bureau of Labor Statistics). (2018d). "Total US Job Openings - Construction Industry." [https://data.bls.gov/timeseries/LNU04032231?amp%253bdata\\_tool=XGtable&output\\_view=data&include\\_graphs=true](https://data.bls.gov/timeseries/LNU04032231?amp%253bdata_tool=XGtable&output_view=data&include_graphs=true) (Accessed February 2, 2019)
- Construction Industry Institute (CII). (2015). *Is there a Demographic Craft Labor Cliff that will Affect Project Performance?* Research Team number RT318, Austin, TX
- Construction Users Round Table (CURT). (2004). "Confronting the Skilled Construction Workforce Shortage." Construction User Roundtable Publications, Ohio, USA
- Dickens, R. (2019). "The State of the Construction Industry." *For Construction Pros*, <https://www.forconstructionpros.com/business/article/21041305/special-report-state-of-the-construction-industry-2019> (Accessed July 4, 2019)
- Francis, V., and Prosser, A. (2013). "Career counselors' perceptions of construction as an occupational choice." *J. Prof. Issues Eng. Educ. Pract.*, DOI:10.1061/(ASCE)EI.1943-5541.0000125, 59–71.
- Karimi, H. (2017). "Quantitative analysis of the impact of craft labor availability on construction project performance." *PhD Dissertation*, University of Kentucky
- Karimi, H., Taylor, T., and Goodrum, P. (2017). "Analysis of the impact of craft labor availability on North American construction project productivity and

- schedule performance.” *Construction Management and Economics*, 35(6), 368-380.
- Karimi, H.; Taylor, T., Goodrum, P., and Srinivasan, C. (2016). Quantitative analysis of the impact of craft worker availability on construction project safety performance. *Construction Innovation*, 16(3), 307-322.
- McGraw-Hill Construction. (2012). *Construction industry workforce shortages: Role of certification, training and green jobs in filling the gaps*. Smart Market Report, Bedford, MA
- Minooei, F. (2018). "Towards a Deeper Understanding of the US Workforce Development System in the Construction Industry." *PhD Dissertation*, The University of Colorado at Boulder
- Narehan, H., Hairunnisa, M., Norfadzillah, R. A., and Freziamella, L. (2014). “The effect of quality of work life (QWL) programs on quality of life (QOL) among employees at multinational companies in Malaysia.” *Procedia-Soc. Behav. Sci.*, 112, 24–34.
- Shan, Y., Imran, H., Lewis, P., and Zhai, D. (2017). “investigating the Latent Factors of Quality of Work-Life Affecting Construction Craft Worker Job Satisfaction.” *J. Constr. Eng. Manage.*, 143 (5), 04016134. DOI: 10.1061/(ASCE)CO.1943-7862.0001281
- The Business Round Table (BRT). (1983). *More construction for the money*. Construction Industry Cost Effectiveness Project, Summary Report, Ohio, USA
- USCB (United States Census Bureau). (2019). “Construction Spending: Value of Construction Put in Place at a Glanc.” <https://www.census.gov/construction/c30/c30index.html> (Accessed July 4, 2019)
- Wang, Y., Goodrum, P. M., Haas, C. T., and Glover, R. W. (2008). "Craft training issues in 781 American industrial and commercial construction." *J. Constr. Eng. Manage.*, 782 10.1061/(ASCE)0733-9364(2008)134:10(795).
- Wang, Y., Goodrum, P. M., Haas, C., Glover, R., and Vazari, S. (2010). “Analysis of the benefits and costs of construction craft training in the United States based on expert perceptions and industry data.” *Constr. Manage. and Econ.*, 28(12), 1269-1285.