



White Paper

Transportation Systems Management and Operations (TSMO) Workforce Pipeline - Expanding Opportunities

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Highlights

- Filling Transportation Systems Management and Operations (TSMO) professional and para-professional position will continue to challenge state DOTs and other transportation agencies.
- Building on a previous Technical Memorandum by NOCoE related to establishing a pipeline of workers from the military, this white paper takes the initial step in describing additional, future workforce pipelines for Historically Black Colleges and Universities (HSBCs, technical colleges, jobs corps, retiring emergency responders, and non-traditional workers.
- Technical staff need to work closely with human resources staff to shift recruiting and hiring methods and practices to realize the benefits associated with potential pipeline communities.

IN THIS WHITE PAPER YOU WILL LEARN:

1. About existing programs that could be leveraged to bring different sources of workers to support TSMO activities.
2. About a range of potential opportunities to establish workforce pipelines beyond traditional sources.
3. About ideas for tapping into non-traditional workers.

Introduction

The current labor shortage and evolving nature of TSMO workforce requirements necessitate an assessment of potential pipelines for recruiting and hiring TSMO talent in transportation agencies. The National Transportation Pathways Initiative looked at ways to attract transportation operations workers who are tech-savvy, flexible, responsive, adaptive to emerging and evolving technologies, effective communicators, and have skills in decision making and data acquisition, management, and analysis. The Southeast Transportation Workforce Center found the lack of awareness of transportation operations careers to be a significant obstacle to attracting new workers. ([NTCPI Final Report](#)) The increasing diversity of knowledge, skills, and abilities (KSAs) needed to staff an effective TSMO program opens opportunities to look beyond traditional labor sources. As part of NOCoE's workforce development initiative, a comprehensive assessment of the military pipeline was presented in [Assessing Pipeline Trends for Target Groups - Military](#). This whitepaper explores other potential target groups for expanding the TSMO workforce pipeline, including educational institutions, emergency responders, and nontraditional workers.

Casting a Wider Net

The traditional sources of new hires in transportation agencies are civil engineering programs and employees currently working in the field of transportation. TSMO draws on a wide range of KSAs not traditionally found in these sources, including data analytics, computer science, systems engineering, electrical engineering, decision science, and telecommunications. Developing an understanding of the specific skills needed to support the variety of TSMO functions can help identify fields and industries where those skills can be found. For example, data analytics and trend analysis may align with the capabilities of statisticians and economists. Other fields such as system or industrial engineering, data and computer science, and behavioral science can all bring new insights and capabilities to the emerging field of TSMO. Expanding the potential labor pool by casting a wider net brings in a diversity of perspectives and experiences to address transportation challenges.

To attract workers from other fields to TSMO, it is important to tell a compelling story of the importance of TSMO in society and to paint a picture of the field that allows potential workers to see themselves as transportation professionals. Research has found that the lack of awareness of the transportation industry in general, and TSMO in particular, is a significant barrier to attracting diversity (technical and social) to the TSMO workforce. ([NNTW, Executive Summary: The Transportation Operations Discipline](#))

Historically Black Colleges and Universities

A recent article in Protocol ([How Microsoft, Apple, Amazon and others partner with HBCUs - Protocol](#)) looked at the relationships built by the tech industry with historically Black colleges and universities (HBCUs) over several decades. The article notes that despite current labor, Black workers, who make up 11 percent of all employed adults, make up only 9 percent of STEM occupations and just 5 percent of engineering positions. The share of Black workers in STEM jobs has not changed since 2016. The numbers were slightly different for graduates of HBCUs, with a 1 percent increase in Black workers in technology jobs at large tech companies from 2014 to 2021. These numbers have spurred the tech industry to partner with HBCUs to increase hiring its graduates.

Partnerships between HBCUs and tech companies include an Amazon Web Services partnership with Howard University to develop a data science and cloud concept-based master's program, and Apple's New Silicon Initiative that supports HBCU engineering programs through grants. A successful example of building partnerships between HBCUs and a transportation agency is the Michigan DOT's Transportation Diversity Recruitment Program (TDRP). The program, which began in 2013, offers on-the-job training and job shadowing to undergraduate HBCU students in engineering and other transportation related fields. The 10-week program provides an opportunity to work alongside professionals in engineering, inspection, and project management. (AASHTO Center for Environmental Excellence, [Video Highlights Michigan DOT Diversity Recruitment Program](#))

The US Department of Labor developed a guide to support recruiting new employees from HBCU, [HBCU Recruitment Strategies](#). The guide is targeted at developing a culture of diversity in federal contractors and discusses the benefits and strategies for building relationships with HBCUs. Another guide available

online is the Handshake [Guide to Recruiting at HBCUs](#). This guide includes a brief history of HBCUs, the benefits of recruiting from HBCUs, the qualities Black students look for in an employer, and tips for recruiting at HBCUs. The guide notes that 60 percent of the top majors at HBCUs are STEM-related, including computer science and mechanical engineering.

Technical Colleges and Jobs Corps

Technical colleges or trade schools offer a traditionally overlooked pipeline for transportation agencies, not only for paraprofessional positions but for professional positions. These postsecondary schools prepare students for specific careers in fields such as electrical technician, computer programmer, and data analytics. They usually provide hands-on experience to support focused skills and knowledge. Trade school graduates can offer specific skills that current employees do not have and the potential for growing their knowledge, skills, and abilities to meet the needs of the organization. New hires from technical colleges may not have the traditional requirements for transportation agency professional positions, such as a four-year degree or engineering license, but their training and interest can be developed and expanded to allow them to move into professional positions through on-the-job training and agency funded education.

The US Chamber of Commerce published a guide for recruiting from trade schools, *How to Recruit Employees from Trade Schools*. It offers five ways to recruit employees from trade schools, including developing partnerships with the schools, offering internships or apprenticeships to students, connecting with career and technical student organizations, attending job fairs at the schools, and offering competitive benefits.

Job Corps is the largest nationwide residential career training program, focused on training young people from ages 16 to 24 for meaningful careers and helping them obtain employment. This federal program provides grants for workforce development that offer tuition, housing, and basic needs assistance. Current program areas include information technology, construction, and transportation. Job Corps graduates enter the workforce or an apprenticeship, go on to higher education or enter the military. Partnerships between transportation agencies and local Jobs Corps programs can provide an opportunity for the agency to access young adults looking for career opportunities in their area. (Job Corps)

Emergency Responders

Another source of potential TSMO workers is emergency response professionals looking for encore careers after completing their service. A sizable number of law enforcement officers, firefighters, and other emergency responders start their career when they are young, right out of high school or college. These professionals may qualify for a full pension in their forties or fifties and not be ready to retire. Many interests, skills, and experiences translate well to TSMO needs and positions. Transferable skills include critical thinking and decision making, communications, management and leadership, situational awareness, conflict resolution, flexibility and adaptability, familiarity with roadway operations and on-scene safety, working with the public, being a team player, and dedication to public service.

Transportation agencies have hired retired law enforcement officers to work with their TMC and traffic operations teams to support traffic incident management programs. Fire and EMS professionals bring knowledge of hazardous materials safety, opportunities to enhance coordination with local response agencies, and knowledge and experience of emergency operations practices and protocols. Law enforcement professionals offer investigative and security skills as well. Building relationships with local emergency response and public safety organizations can provide an opportunity to develop a potential pipeline from their professionals when they decide to retire from their first career. ([23 Fantastic Jobs for Retired Police Officers: Second Careers](#), [10 traits of great firefighters](#))

Non-Traditional Workers

A recent NOCOE publication, [Attracting Non-Traditional Workers into the TSMO Workforce](#), looks at another approach to expanding the potential pool of TSMO workers. It explores:

- Stay-at-home caregivers (parents or companion care)
- Gig-economy workers
- Geographically remote workers
- Neurodiverse workers
- Self-taught workers
- Encore workers
- Second chance workers

Each of these provides an opportunity to go beyond traditional recruiting and hiring practices to consider more flexible approaches to employment. To take advantage of these potential sources, transportation agencies must clearly define the skills and scope of staffing needs to determine opportunities for flexibility in schedule, location, and requirements/qualifications. For example, to hire stay-at-home caregivers, agencies must be able to carve out duties and responsibilities that can be done remotely and on a flexible schedule. To hire self-taught workers, organizations need to identify the specific skills needed, rather than education and certifications, and develop a skills-based hiring system. Geographically remote or gig workers may not reside within the state of the hiring DOT, which may require changes to agency policies or State residency requirements. Each of these groups provides an opportunity to expand the labor pool through planning and policy changes.

Summary

An important part of creating new pipelines for TSMO workers is building partnerships with groups historically overlooked in the recruiting and hiring process. Agencies need to become familiar with the KSAs offered by each group, what their needs and expectations might be, and the best way to communicate with and recruit from each group. This is done most effectively by building relationships and sharing information about opportunities and needs. Partnerships can be formal or informal and lay the foundation for opening each potential pipeline.

Create a culture and work environment that is welcoming and comfortable to a diverse workforce. Recruiting and hiring diversity is only one step of building a diverse workforce, retention is also critical. Too often issues of culture, inherent bias, micro aggressions, and insensitivity undermine an organization's ability to build a truly diverse workforce. Agencies focused on diversity must build their knowledge of the issues that undermine their ability to attract and retain a qualified, diverse workforce.

Create flexibility in position requirements to recruit and grow a skilled workforce. A US Chamber of Commerce Foundation survey found that 74 percent of HR leaders require specific credentials when hiring, yet only 26 percent use the credential in determining candidate qualifications. ([How to Find Qualified Employees](#)) It is important to review requirements and consider which credentials are really essential for success in a position to allow potentially qualified candidates to be considered for openings. Hiring processes built on skills assessment help remove inherent biases in the hiring process.

Review current HR recruiting and hiring practices to identify opportunities to evolve position descriptions, compensation and benefits structures, and job requirements to reflect changing needs and practices in and beyond the agency. This may include simple changes to job descriptions, working within the agency to update HR policies, or even working at the state level to change legal requirements for State employment.

Think outside the box. Look at new sources for potential employees, such as Job Corps, HBCUs, emergency responder organizations, and nontraditional workers. Develop new outreach and recruiting methods that target these new groups. For example, find online forums frequented by nontraditional workers to post jobs that can accommodate their specific needs or limitations. Participate in job fairs and recruiting days that include fields beyond civil engineering and develop materials that speak to the knowledge and strengths of targeted groups. In this tight labor market, creativity and agility are essential to building a strong TSMO workforce.

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