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Broadening Workforce Participation in Transportation: Challenges and Strategies

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CSUTC California State University Transportation Consortium

WTS Advancing women Advancing transportation

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16. Abstract
This Broadening workforce participation in the transportation industry is incredibly challenging. State of practice research highlights the reasons why this lack of participation in the workforce occurs. Fortunately, there are also identified strategies for alleviating the workforce challenges. This report highlights measures that transportation organizations can take to combat some of the workforce challenges they are facing. When organizations are willing to have candid conversations and invest in meaningful policies, this can accelerate a shift in the trust and culture within an industry, making that industry more attractive to the talent pool that exists. Beyond the extensive literature review, this report describes the findings from an industry survey. The survey was distributed for a three-month data collection period, which concluded in July 2024, resulting in 996 usable survey responses. Additionally, the research team interviewed 15 transportation professionals in 2024 to gain deeper insights into the challenges and solutions to the workforce participation in the transportation industry.

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Broadening workforce participation in the transportation industry is incredibly challenging—from the multiple modes it encompasses to the range of roles that are required. There are numerous challenges associated with misogynistic disparities, such as pay gaps and personal feelings of safety and security, which contribute to a decreased female representation in the transportation industry workforce. State of practice research highlights reasons why this lack of parity occurs. Fortunately, there are also identified strategies for broadening workforce participation. This report highlights measures that transportation organizations can take to combat some of the workforce challenges they are facing. When organizations are willing to have candid conversations and invest in meaningful progressive policies, this can accelerate a shift in the trust and culture within an industry, making that industry more attractive to the talent pool that exists.

Description of Methods

This report was developed as a tool for transportation entities to use as they fight to broaden their employee talent pool. To accurately capture the state of the practice of the transportation industry, the research team conducted a literature review and data analysis, followed by the development and dissemination of a survey. The survey was distributed for a three-month data collection period, which concluded in July 2024, resulting in 996 usable survey responses. The survey data was analyzed, and additional interviews were conducted with 15 transportation professionals in 2024 that represent many sectors of the transportation industry. Once all data was collected, the report was drafted.

Key Findings from Literature

While the percentage of women in the transportation industry has moderately increased in the past decade, women remain underrepresented throughout the industry, including being underrepresented in leadership roles. Unfortunately, the Bureau of Labor Statistics, the organization where this type of data is annually collected, does not have one specific category that describes transportation professionals. The share of women in transportation and utilities occupations have increased 1.9% in the past decade, reaching a total of 24.5% of the total workforce. Similarly, the share of women in transportation and warehousing occupations has increased 2.2% between 2015 and 2024, reaching a total of 24.9%. The literature confirms that while some sectors of the transportation industry have better female representation than others, most modes within the transportation industry remain male dominated, and in many cases the data is not even available to fully measure this lack of representation.

There are incredible motivations for greater gender diversity within an organization, as it is linked to reduced employee turnover of both men and women, increased attractiveness to potential recruits, and greater job satisfaction, just to emphasize a few benefits. Despite the motivations that exist, there remain challenges to achieving gender parity within the industry. A lack of awareness of the benefits and opportunities in the transportation industry, a decreased sense of belonging that exists due to minimal gender representation, and challenges with intersectionality continue to hinder gender diversity efforts in the transportation industry. Intersectionality is the idea that impacts from gender, race, and other demographic and socioeconomic characteristics combine in an overlapping manner rather than in a way isolated and distinct from one another.

Despite the undeniable challenges, there are strategies for increasing gender diversity in transportation that were identified. Outreach to encourage future generations to choose transportation career paths is repeatedly recognized as a beneficial strategy to increase gender diversity. Sense of belonging is a key aspect determining whether a person chooses to remain in the industry in which they are currently employed, and thus mentorship and employee resource groups have been touted as beneficial investments in fostering a culture of inclusivity and belonging among employees. As the diversity of the population continues to increase, the workforce should also increase in diversity, leading to increased opportunities for improvement in the future. Harnessing the ever-changing landscape of the transportation industry as a driver of diversity has the potential to benefit the transportation workforce significantly.

Key Findings from Original Research as Part of This Study (Interviews & Surveys)

The findings associated with the underrepresentation of women in the transportation industry outline the business case for gender diversity, key barriers, and potential strategies to accelerate more inclusive representation in the workforce. Notably, organizations must approach gender balance with intentionality and with a holistic strategy to achieve the greatest success. However, while a significant body of literature exists regarding the experience of women more broadly in the workforce, more insight is needed for the transportation industry specifically.

The interview takeaways are mostly focused on the primary barriers to achieving more balanced gender representation in the transportation industry and the strategies or initiatives for attracting and retaining diverse representation. However, one interesting observation from the collection of responses related to each participant's journey into and throughout the transportation industry is the general similarities that most women reveal regarding how their careers transition from student to more senior roles, including careers that flourish despite self-doubt and in part because of sponsors that have served as champions for them when they weren't in the room to advocate for themselves. These similarities among successful women serve as proof to the next generation of women leaders that success does not rely solely on self-assurance, and capabilities consistently surpass personal expectations when coupled with support and guidance.

Recommendations for Policy and/or Additional Research

The conclusions and recommendations in this report are derived from the extensive literature review, responses from the survey of the transportation industry, and responses from interviews with various transportation professionals. The literature review indicates that while representation of women has increased over the last several decades, women remain underrepresented throughout the industry, especially in leadership roles. The literature confirms that while some sectors of the transportation industry have better female representation than others, most modes within the transportation industry remain male dominated, and in many cases the data is not even available to accurately measure the lack of representation. While the Bureau of Labor Statistics provides trends in the shares of women representation in certain occupations, the way that the occupations are categorized make meaningful analyses of transportation specific occupations impossible. For example, while women represent 8.9% of the rail transportation workforce, 17.2% of civil engineering workforce, or 26.4% of computer and mathematical occupations, there is no way to identify how many of those civil engineers or computer scientists work in the transportation industry. These broad averages, while valuable, do not tell the full story, nor do they allow for any understanding of the variations in shares across different regions.

1. Introduction

The transportation industry is incredibly broad—from the numerous modes it encompasses to the range of roles that are required. Defined generally, workers in the transportation industry support the safe and efficient movement of people or goods via modes and vehicles such as personal vehicles, public transit, bicycles or walking, rail, commercial vehicles, air, water, and evolving forms of micro mobility. They may work for the public or private sector, non-profits, academia, research institutions, or international organizations serving a public service mission or ensuring profitable operations. They may design, construct, or maintain infrastructure; be responsible for safety initiatives; encourage mode shifts; or be involved in operations such as ensuring timeliness of passenger travel or freight shipments. The transportation workforce includes operators, maintenance staff, technicians, craft workers, engineers, planners, attorneys, human resources and other administrative personnel, marketing professionals, logisticians, analysts, computer and data scientists, and numerous other roles. Further, points of entry into the industry are available from roles requiring high school education or equivalent to roles demanding advanced degrees. Yet, despite the expansive opportunities that exist across the transportation industry, gender diversity has always been a challenge, particularly for technical and managerial roles.

While many of the challenges the transportation industry faces are not unique to the transportation industry, there are many deeply-rooted systemic biases that have exemplified the challenges working women face. Work-life balance is traditionally increasingly challenging for women; as the typical caregivers in the household, women have traditionally held more domestic responsibilities than men. This generality leads to many unintended biases that many professionals are not even aware that they possess. These biases lead to unfair recruitment and hiring strategies, acceptance of misogynistic rhetoric and workplace harassment. These biases also contribute to the pay gaps and unequal advancement opportunities that are pervasive throughout the transportation industry. The lack of representation in both technical and leadership positions make women more susceptible to discriminatory workplace behavior.

In recent years, workforce pipeline challenges have emerged as one of the most critical issues faced by the transportation industry. Additionally, the complexity of problems that must be solved to ensure safe, efficient, and sustainable transportation operations and infrastructure also continues to increase. These factors have led to transportation leaders increasingly recognizing the importance of diversity, not just for attracting the number of needed workers but also for supplying the range of backgrounds and perspectives necessary for developing robust and innovative solutions. The focus of this research is on examining the current state of gender diversity in the transportation industry and identifying strategies for creating a more inclusive model for workforce development. The research includes a comprehensive literature review along with deployment of an industry survey and series of interviews. The findings are intended to serve as a resource for transportation industry leaders that will support inclusion initiatives and policy advocacy to move the industry toward gender parity.

2. Methodology

With an understanding of the complexities that surround the workforce shortage challenges in the transportation industry, and many contributing factors to those shortages, the research team conducted a thorough literature review and data analysis. Beyond the literature review, a survey was developed to gain the insight of current members of the transportation industry on their personal feelings of opportunity, feelings of belonging, prevalence of harassment while working, and overall industry satisfaction. The survey was distributed for a three-month data collection period, which began in May 2024 and concluded in July 2024. The survey was distributed through LinkedIn and through various listservs and newsletters, including WTS newsletters, to ensure a significant number of female responses would be collected. The survey dissemination efforts resulted in 996 usable survey responses. Additionally, beyond the survey, the research team interviewed 15 transportation professionals throughout 2024 to gain deeper insights into the challenges and solutions to the workforce participation in the transportation industry.

3. Literature Review

The transportation industry is comprised of a wide range of sectors, modes, and occupations. Because of this, the definition of the transportation workforce is often quite varied, depending on how and by whom it is being discussed. This can make it challenging to fully understand gender representation and diversity challenges. For this research, a more inclusive definition that encompasses both the public and private sector and workers from the front line to the c-suite is adopted.

Gender diversity has long been a topic of conversation in the transportation industry, with recognition that the percentage of women in transportation lags significantly behind the fraction in the overall workforce. While women make up nearly half of the U.S. workforce as of 2024, they represent approximately 8 to 35% of transportation workers, depending on the role (Bureau of Labor Statistics, 2023). The focus on gender parity has increased in importance globally with recognition of the need for diverse perspectives to be included to solve complex transportation challenges and that pipeline issues necessitate a more inclusive approach to attracting and retaining talent.

After defining what is included in the analysis of the transportation industry for this research, this literature review presents the state of knowledge and practice related to the transportation workforce including:

- State of gender diversity in transportation

- Gender representation by mode and sector

- Motivation for gender parity

- Challenges to achieving gender parity

- Successful strategies for increasing gender diversity in transportation

- Opportunities for the future

Findings from this review, in combination with results of an industry survey and interviews, will inform recommendations for leaders and policy makers to support a more gender-inclusive approach to transportation workforce development.

3.1 State of Gender Diversity in Transportation

First, when examining the number of women in the labor force, the number has been increasing since 1948 when the Bureau of Labor Statistics (BLS) first started collecting the data. While

women remain below men in terms of nominal labor force values, the increase in women's participation is greater than that of men, making the nominal difference smaller over time, as shown in Figure 1.

Figure 1. Employment levels by gender (Federal Reserve, 2024)

Employment Level - Women, Thousands of Persons, Annual, Seasonally Adjusted
Employment Level - Men, Thousands of Persons, Annual, Seasonally Adjusted
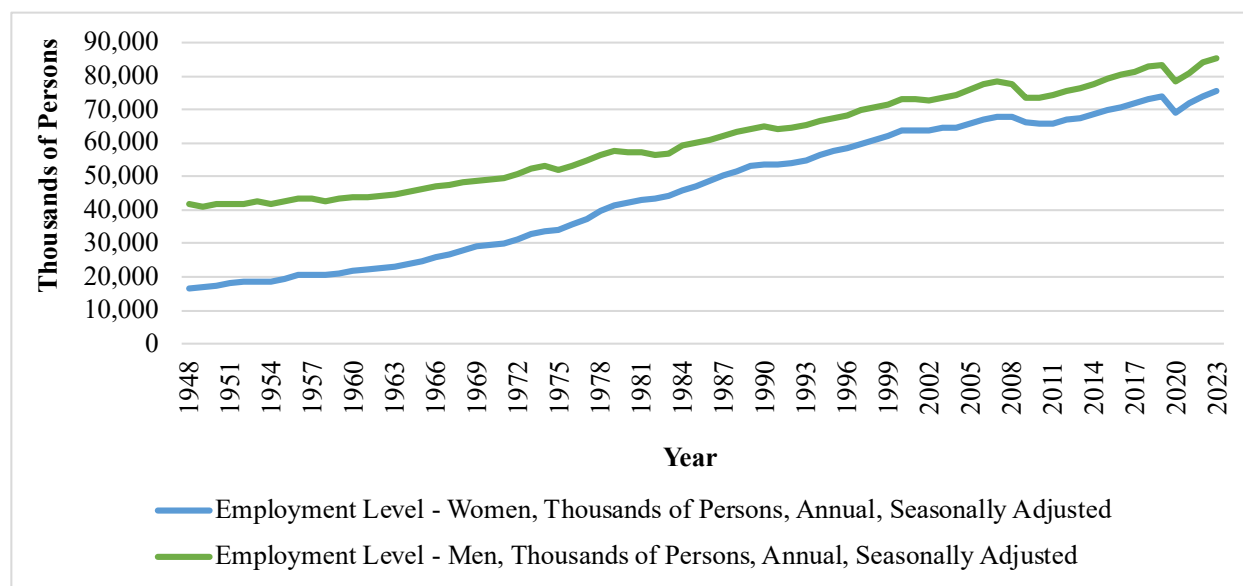
When defining the transportation industry, often the data sources provide values that may be convoluted for a specific desired analysis. For instance, when trying to examine workforce trends of transportation engineers, the BLS combines transportation and utilities together as one sector, under which transportation and warehousing exists, as shown in Figure 2. Examining the changes in the share of women in these two industry categories shows a very small increase from around 22% to around 26% in the past decade. One challenge with truly understanding the gender diversity of any industry is defining that industry in a way that aligns with the data collection methods that already exist within the BLS.

Figure 2. Share of Women Employees, 2014–2023
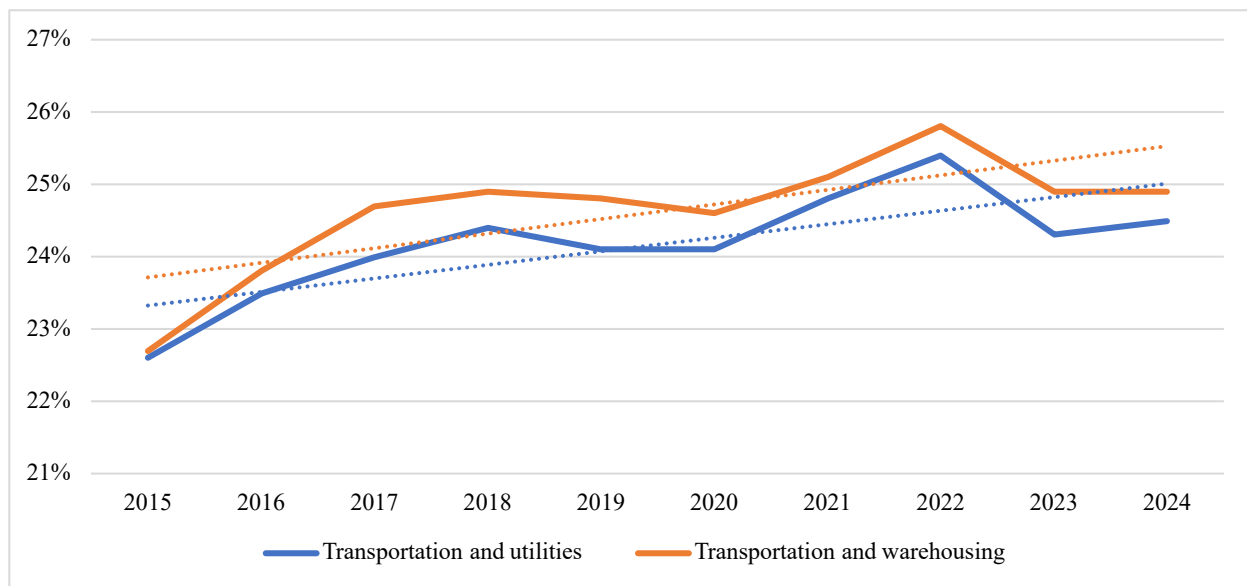
While the current data collection methods provide perspective into the overall workforce picture, it is important to examine gender representation by mode within the transportation industry.

3.2 Gender Representation by Mode

Women have been historically underrepresented in the U.S. rail industry, and that lack of gender diversity has been recognized as a top challenge in recruiting and retention efforts (Leone, Lacey, & Barnes-Farrell, 2023). The disparity is so great that many of the data collection efforts are hindered by small sample sizes when trying to analyze gender representation by job type. In 2020, women accounted for 24.1% of all workers employed in the transportation industry with rail representing the lowest share of women employees at just 7.4% (Bureau of Labor Statistics, 2023).

The majority of the transit workforce is also male (71%), though the representation is not homogeneous among job types as women are overrepresented in administrative-support roles, yet only represent 20% of officials and administrators, 24% of technical workers, and only 5% of skilled craft workers (Agrawal, Blumenberg, Loukaitou-Sideris, & Lu, 2024).

Baseline data related to gender and specific job categories within state departments of transportation were examined in a 2024 NCHRP Synthesis titled "Advancing Gender Equity in the DOT Workforce" and found to be too scarce to provide a comprehensive benchmark, despite the Equal Employment Opportunity efforts that have been established (National Academies of Sciences, Engineering, and Medicine, 2024). This inability to even measure the gender equity within state DOTs is another clear sign that there is still tremendous room for improvement of gender parity throughout the transportation industry.

With a goal of obtaining an understanding of the representation of women in the transportation industry, we examined the Bureau of Labor Statistics data focusing on each of the sectors that are certainly representative of the transportation industry. We are cognizant that these figures are still exclusive of many transportation professionals, such as the authors of this report, that do not fall cleanly into any of these categories. Many transportation researchers, transportation engineers, and planners are not included in these values. However, these values give insight into the data for which we do have access. Figure 3 displays the trends in the shares of women employed by industry for several industries that may fall within the transportation sector. Figure 3 helps to display the comparison of shares of women representation across transportation industries. The individual trends are shown in Figure 4 through Figure 12.

Figure 3. Trend in the Share of Women Employed by Industry, 2015–2024
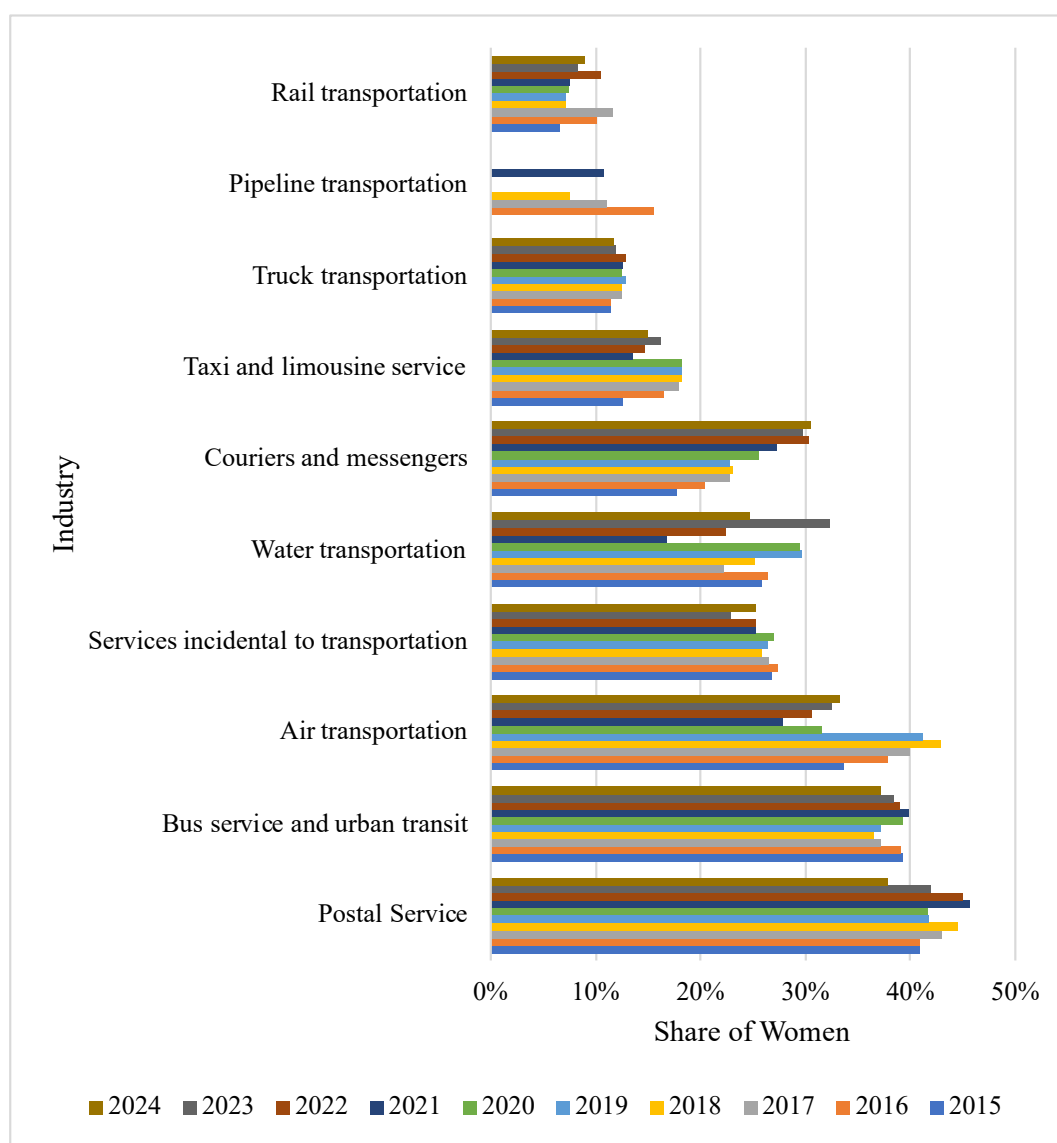
The examination of the individual annual trends in women representation in the sectors identified in Figure 3 are expanded upon in Figure 4 through Figure 12, beginning with the largest shares of women. As each of the following figures is examined, it is important to note that the vertical axes do not have consistent values for all sectors. Figure 4 shows the share of women employed in the postal service between 2015 and 2024, which is a slightly decreasing trend over the past decade. Figure 5 displays the share of women employed in the bus and urban transportation, which has slightly decreased over the past decade. Figure 6 shows the share of women employed in the air transportation industry, which is a decreasing trend over the past decade, though slight increases have been witnessed since 2021. Figure 7 displays the decreasing trend of women employed in services incidental to transportation over the past decade. Figure 8 shows a slight increase in the share of women employed in water transportation over the past decade. Figure 9 shows a steep increase in the share of women employed as couriers and messengers since 2014. Figure 10 shows the generally fluctuating trend of women employed in the taxi and limousine services, which is slightly decreasing over the past decade. Figure 11 displays the share of women in trucking, which has increased from 11.4% in 2015 to 11.7% in 2024. Finally, in this section, Figure 12 displays the slight increase in the trend of women in the rail workforce from 2015 through 2024. Together, these figure show that the changes in the shares of women employed in transportation are slow and many sectors within the transportation industry are witnessing recent decreases.

Figure 4. Share of Women Employed in the Postal Service, 2015–2024
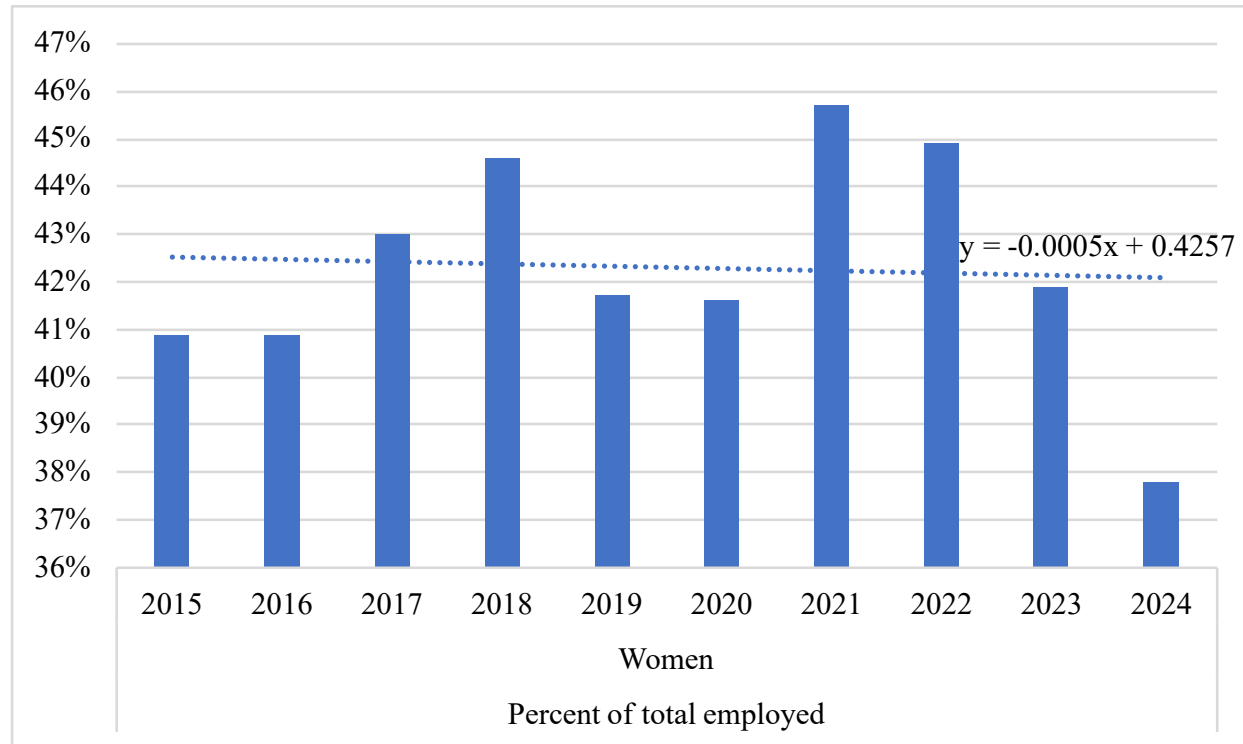
Figure 5. Share of Women Employed in the Bus and Urban Transit Service, 2015–2024

y = -0.0001x + 0.3833

Women

Percent of total employed
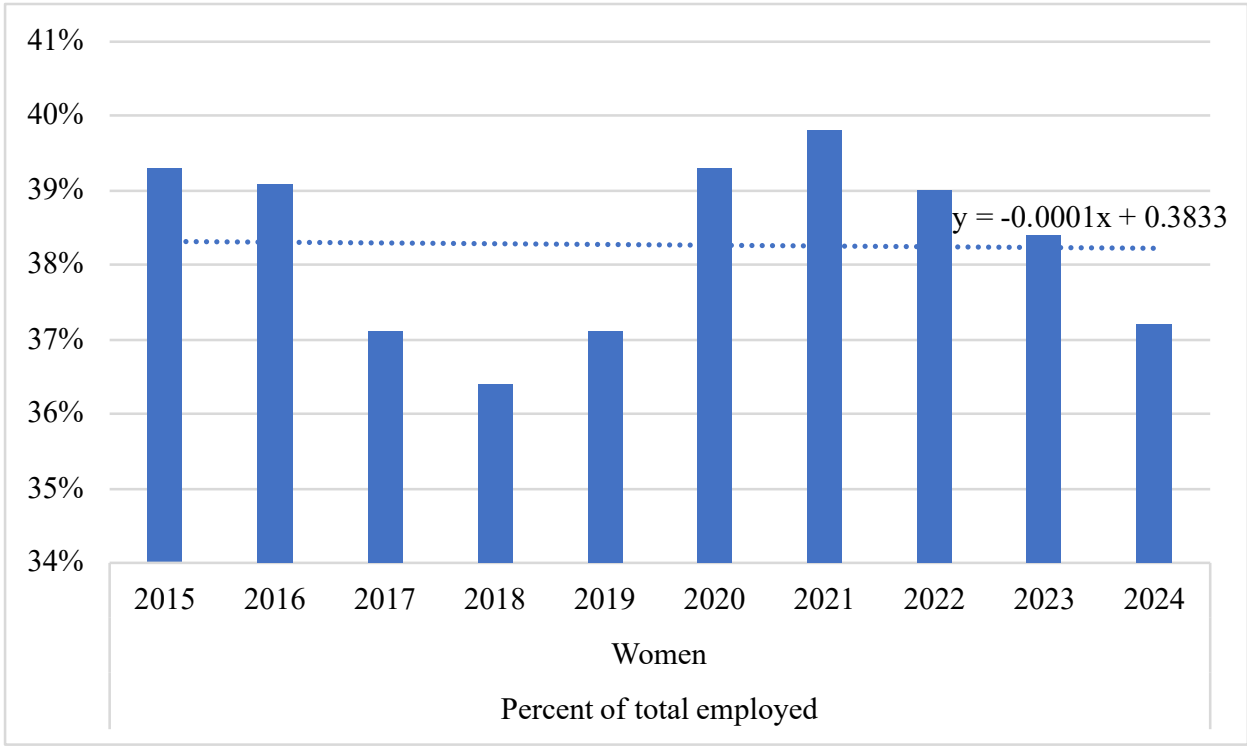
Figure 6. Share of Women Employed in the Air Transportation Service, 2015–2024

y = -0.0086x + 0.3989

Women

Percent of total employed
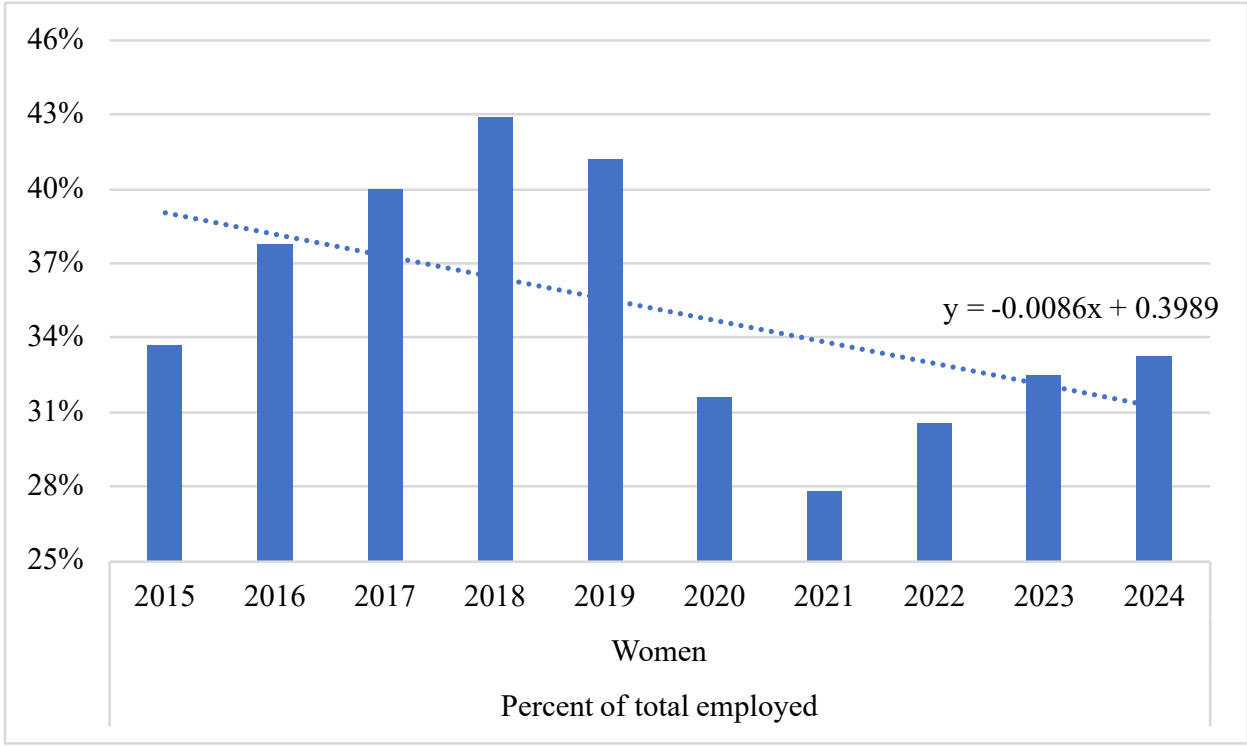
Figure 7. Share of Women Employed in Services Incidental to Transportation, 2015–2024

$y = -0.0032x + 0.2759$

Women

Percent of total employed
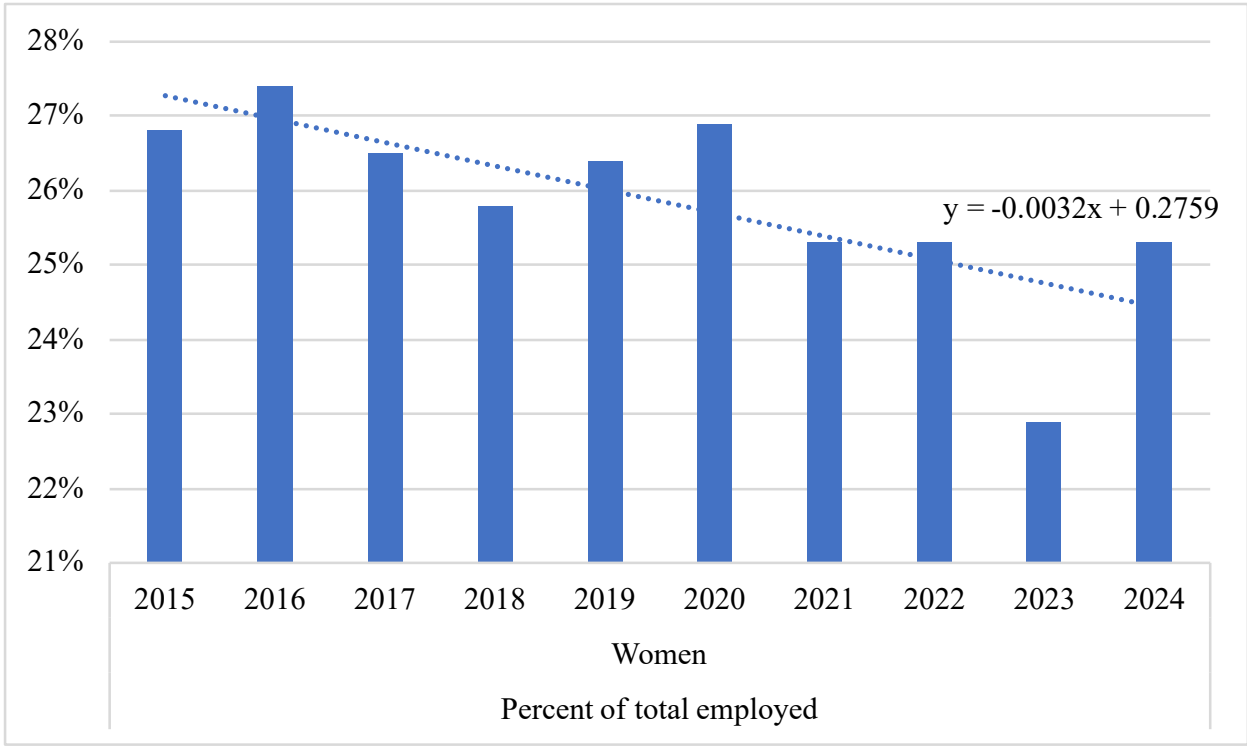
Figure 8. Share of Women Employed in Water Transportation, 2015–2024

$y = 0.0003x + 0.2529$

Women

Percent of total employed
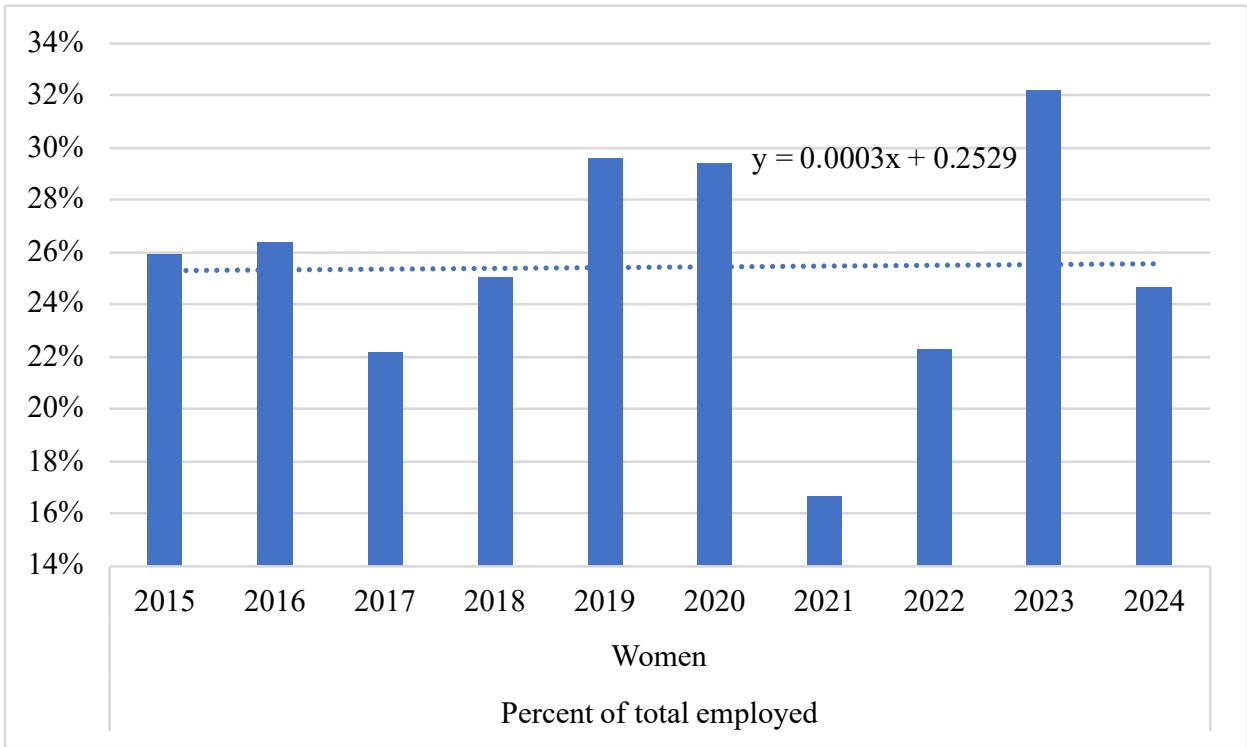
Figure 9. Share of Women Employed as Couriers and Messengers, 2015–2024

$y = 0.0141x + 0.1722$

Women

Percent of total employed
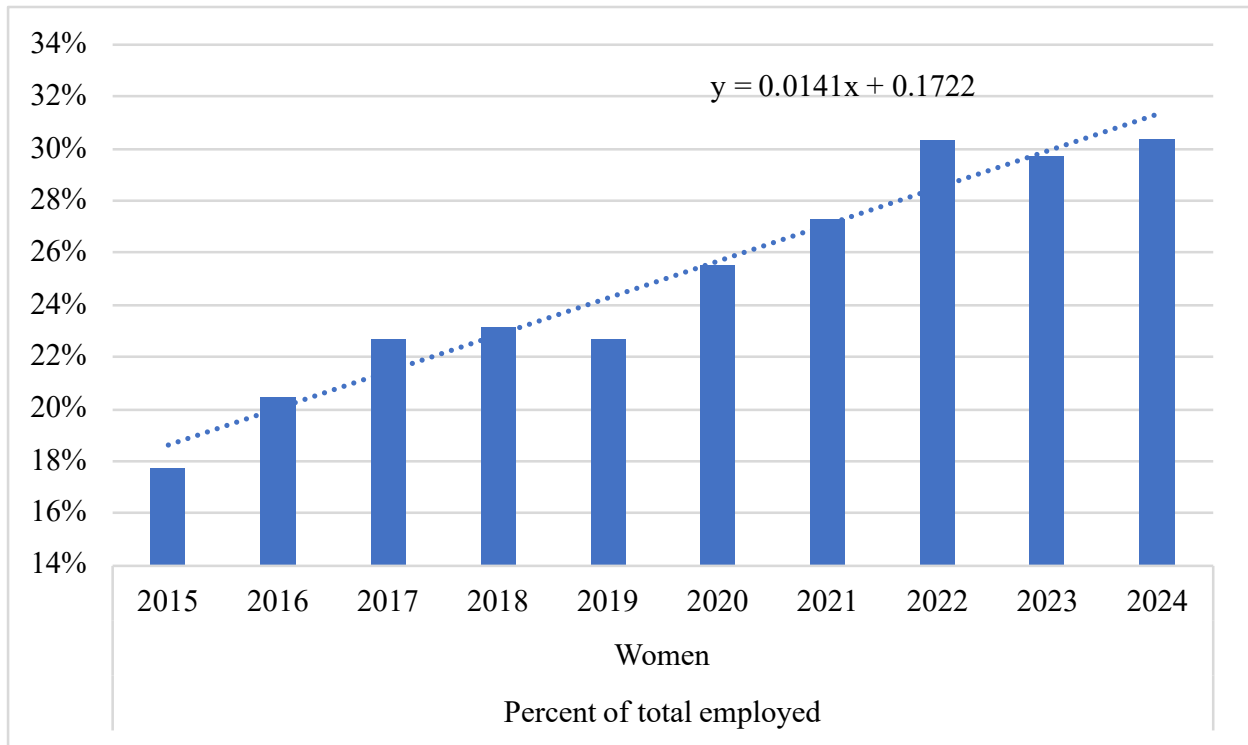
Figure 10. Share of Women Employed in the Taxi and Limousine Service, 2015–2024

$y = -0.0006x + 0.1643$

Women

Percent of total employed
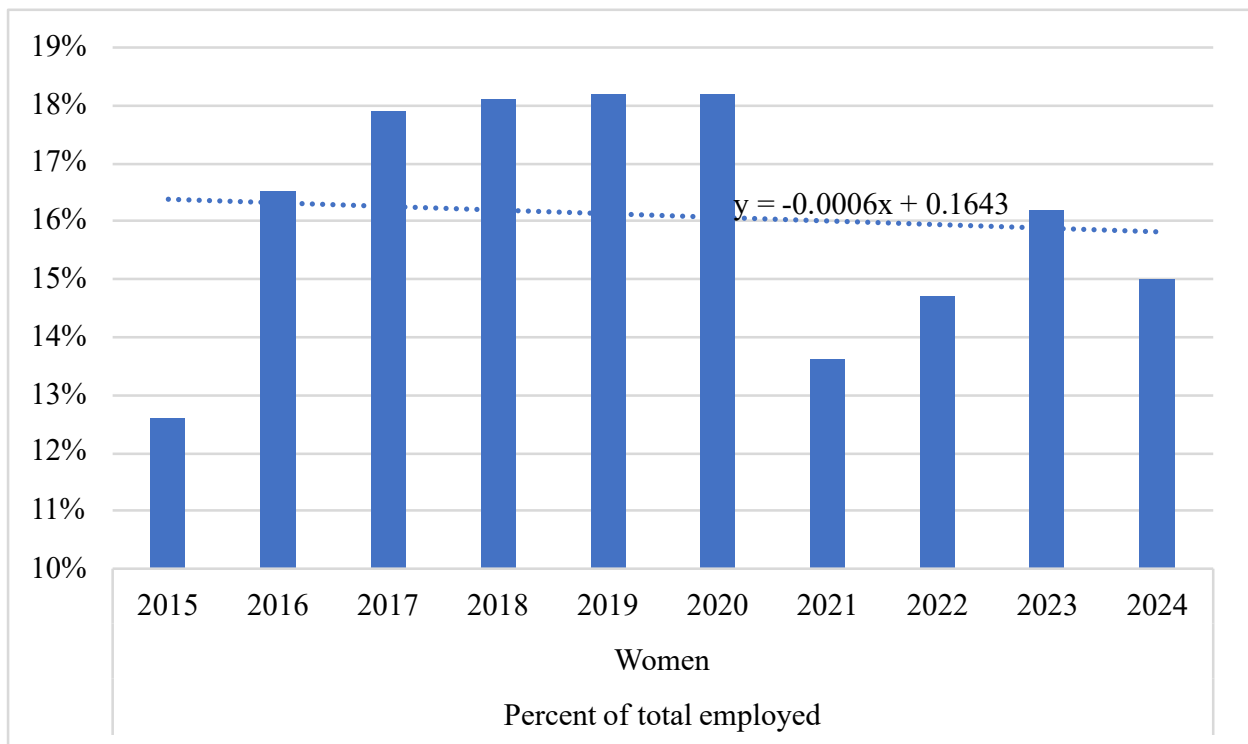
Figure 11. Share of Women Employed in Truck Transportation, 2015–2024

$y = 0.0004x + 0.1198$

Women

Percent of total employed
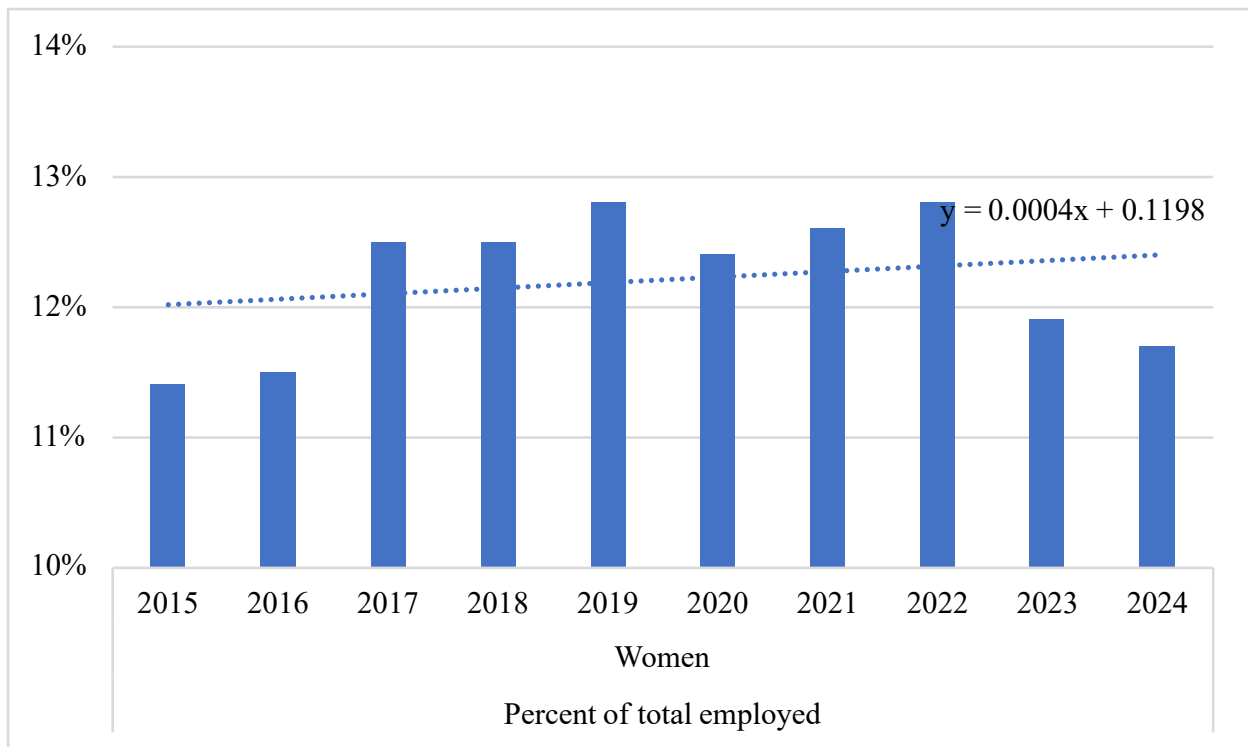
Figure 12. Share of Women Employed in Rail Transportation, 2015–2024

$y = 0.0002x + 0.0841$

Women

Percent of total employed
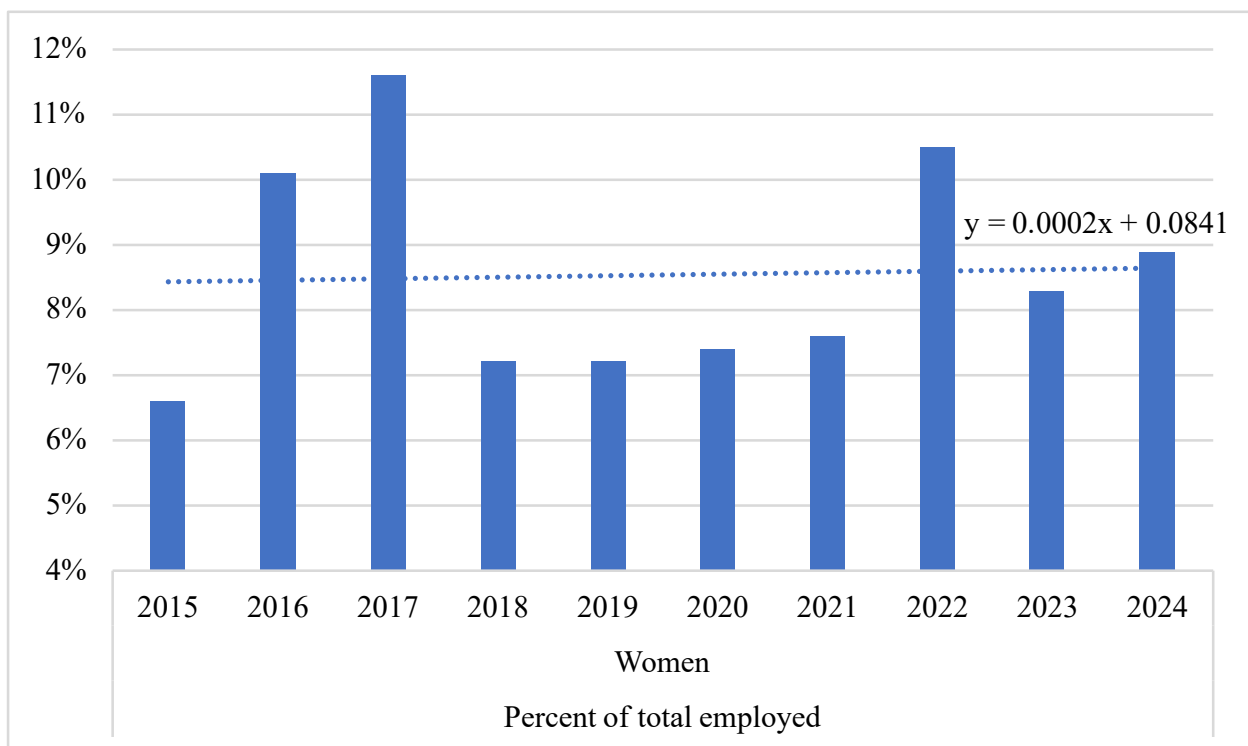
3.3 Motivation for Gender Parity

There are many reasons why organizations are shifting focus to inclusive hiring practices and culture. Greater gender diversity within an organization is linked to reduced employee turnover of both men and women (Hunt, Prince, Dixon-Fyle, & Yee, 2018), increased attractiveness to potential recruits, and greater job satisfaction (Glassdoor, 2020; Gartner, Inc., 2023; McKinsey & Co., 2023b; McKinsey & Co., 2023a). When women are well-represented across an organization, and especially at leadership levels, more inclusive cultures and supportive working environments are the result (FP Analytics, 2020).

One important reason for increased representation of women in leadership roles is that organizations who achieve greater gender parity at the top tend to outperform those that do not (FP Analytics, 2020; McKinsey & Co., 2023a; USAID, 2023). In fact, research conducted by McKinsey and Company (2023a) shows an increasing gap over time between organizations with the greatest gender diversity at the executive level, with the most recent data indicating these organizations financially outperform those with low female representation by nearly 40%. Companies with the greatest diversity at leadership levels also achieve the most positive environmental and social impacts (FP Analytics, 2020; McKinsey & Co., 2023a).

In keeping with the findings that greater gender diversity within an organization boosts organizational performance, a 2019 report also found that innovation is positively impacted by increased representation of women within a company (Accenture, 2019). In fact, the study highlighted an increase in innovation mindset as equity culture within the organization increased. Additionally, creating a more inclusive culture was found to have a more than 40 times greater impact on innovation within an organization than increasing pay (Accenture, 2019).

These studies highlight the business case for realizing gender parity within an organization and for inclusive practices and fostering a sense of belonging more broadly. When organizations commit to including diverse perspectives and ensuring a culture of equity, positive outcomes result. The positive changes impact not only recruitment and retention, but also organizational performance.

3.4 Challenges to Achieving Gender Parity

While the benefits of gender inclusivity are well established, there remain numerous challenges to its achievement in many organizations. One key challenge for the transportation industry is the lack of awareness of the diverse opportunities the industry provides (National Academies of Sciences, Engineering, and Medicine, 2024; Ng & Acker, 2020; Ivey, 2019). The fact that transportation is a part of everyday life may also lead to the roles required to maintain, sustain, and innovate this industry being largely invisible (Ivey, 2019). Transportation may also primarily bring to mind roles that are thought of as "only for men" and generally negative connotations of the work and working environment (Turnbull, 2013; Ng & Acker, 2020; FP Analytics, 2020). However,

technology advances are shifting the requirements for transportation jobs across the board, and roles are increasingly less labor-focused and require more technical or science, technology, engineering, and mathematics (STEM) competencies, and misperceptions must be actively addressed (Barrientos, 2019).

A sense of belonging within an industry is crucial for attracting and retaining workers. A sense of belonging is often cultivated via peer or mentor interactions and requires that an individual not only sees themself as a member of the industry but also feels that they "fit" in terms of alignment of ideals and interests. Women often struggle to find mentors and role models within transportation and other male-dominated industries (Godfrey & Bertini, 2019; Funk & Parker, 2018). This can contribute to a decreased sense of belonging and identity as a transportation professional.

Organizational culture is another barrier that may prohibit women from entering or being retained in the transportation industry. And while hostile work environments are known to limit career aspirations for women (Gerlach, 2020), a recent study highlighted the fact that microaggressions, though often thought to have no lasting impact on a person's perceptions or job satisfaction, create significant negative outcomes. When these seemingly small slights are faced on a regular basis, the impact compounds and the damage is great (McKinsey & Co., 2023a; Catalyst, 2023). When this type of behavior is allowed to occur within an organization, women are more likely to consider leaving their company, feel burned out, and refuse to recommend their company to others (McKinsey & Co., 2023a; Catalyst, 2023).

A further complication to achieving gender parity is intersectionality. Women who are also underrepresented in the industry in another way such as race, ethnicity, age, ability, or sexual orientation, face further difficulties in developing a sense of belonging and connection within the industry (USAID, 2023). They may also face more bias and institutional barriers to advancing in their careers, greater instances of microaggression, and feel more pressure to take on organizational norms rather than maintaining their individuality (McKinsey & Co., 2023a; McKinsey & Co., 2023b; USAID, 2023). A McKinsey and Co. 2023 report documented that while women's judgement is questioned at higher frequency in general than men's (23% as compared to 17%), 27% of Black women, 33% of LBGTQ+ women, and nearly 40% of women with disabilities face this issue. Similarly, while only 6% of men face comments about their emotional state on the job, 12% of women, 21% of LGBTQ+ women, and 25% of women with disabilities are subjected to such comments (McKinsey & Co., 2023b). Women are also more likely to engage in self-shielding behaviors in response to microaggressions. Twenty-three percent of men report feeling the need to change what they say to be more likeable at work, while 32% of women, 37% of Black women, 37% of LGBTQ+ women, and 49% of women with disabilities report the same (McKinsey & Co., 2023b). Additionally, organizations must ensure they are taking the pulse of culture and diversity, equity, and inclusion (DEI) across the board, as often employees from underrepresented groups have different, and more negative, impressions of culture and DEI than do their majority peers (Glassdoor, 2021).

When women are mired in environments where they must struggle to have their voices heard and where they face continual challenges, even at a micro level, in daily tasks, the stage is set not only for exiting an organization but also an industry (McKinsey & Co., 2023b). And, when they do not have access to opportunities or achieve leadership roles similarly to men, this further creates a setting where women may choose to leave (Gartner, Inc., 2023). Further, when women perceive and experience that they must do more than their male counterparts to earn similar respect and constantly prove their worth, these factors create a situation where women are burned out and begin considering other opportunities, even after achieving the highest ranks within an organization (Aarts, 2024).

These challenges require that organizations take steps to increase awareness of the industry and its job opportunities and proactively develop policies and practices that create an environment supporting an inclusive culture. Without purposefully establishing a culture and expectations for behaviors and interactions within the workplace, environments where microaggressions and other destructive practices are prevalent may be the result. This leads to the continual struggle to achieve gender parity, with little gain over time and, in extreme cases, declining representation of women.

3.5 Successful Strategies for Increasing Gender Diversity in Transportation

Numerous strategies have been found to be successful for increasing gender diversity in transportation roles. These approaches encompass the full lifecycle of work, from recruitment to advancement through the ranks within an organization. A common finding across a range of literature is the importance of early outreach initiatives, especially for male-dominated disciplines such as STEM (Godfrey & Bertini, 2019; FP Analytics, 2020; Gartner, Inc., 2023; National Academies of Sciences, Engineering, and Medicine, 2024; KPMG, 2024). These efforts must take place well before most organizations might typically engage—at the elementary and middle school levels—due to the length of time before a return on investment is realized. Partnerships between industry and academia can help to bridge this gap, creating education and career pathway visibility and fostering career identity (National Academies of Sciences, Engineering, and Medicine, 2024). Strong career identity, such as STEM identity, is especially important for creating a sense of belonging and successfully attracting and retaining women in male-dominated disciplines (National Academies of Sciences, Engineering, and Medicine, 2024; Godfrey & Bertini, 2019).

Inclusive practices in the hiring process are also important for success in recruiting women to transportation roles. This includes ensuring job descriptions and outreach efforts use inclusive language, engaging diverse staff in recruitment efforts, making sure hiring panels are diverse and ensuring onboarding activities highlight resources and supports that are supportive of diverse staff (National Academies of Sciences, Engineering, and Medicine, 2024). Building intentional partnerships for recruiting efforts, such as with academic institutions and professional or community organizations serving women, can also ensure organizations broaden their reach and diversify the candidate pool (National Academies of Sciences, Engineering, and Medicine., 2022).

A 2023 survey on women in supply chain occupations found that increasing transparency and competitiveness of salaries is key for slowing the loss of women at the mid-career point (Gartner, Inc., 2023). The study highlighted the fact that these strategies are the least likely to be an area of focus for organizations responding to the survey, creating a gap, and thus the opportunity to shore up diversity initiatives (Gartner, Inc., 2023). It also identified creating greater visibility and access to advancement opportunities as critical, a strategy also highlighted as a best practice in other research (Gartner, Inc., 2023; O'Brien, Hanlon, & Apostolopoulous, 2023). Monitoring and creating supports that help address issues that lead to burnout are also recommended (Gartner, Inc., 2023). Investments in these types of efforts do pay off. The survey documented that 25–50% of companies surveyed have seen payoffs in terms of increased gender diversity depending on the strategies and roles targeted.

As diversity within an organization increases, it becomes more attractive to diverse candidate pools (Glassdoor, 2020). The attractiveness results not just from more balanced representation, but also the unique attributes and skills that are brought to the organization from diverse staff and leaders. For example, a 2020 study found that companies with greater gender diversity on their boards realized 39–60% improvement in environmental impacts and a 74% higher social responsibility rating than those without it (FP Analytics, 2020). These corporate outcomes make the organizations more appealing to diverse candidates, especially younger generations. Thus, investing in DEI initiatives can lead to positive outcomes at all levels.

The culture of an organization is central to job satisfaction, especially for women. For cultural transformation to happen, it must be initiated top-down and integrated at all levels (FP Analytics, 2020; National Academies of Sciences, Engineering, and Medicine, 2024). Organizations that approach DEI from the business case, starting from executive leadership, tend to create more cultural transformation and effective outcomes (KPMG, 2024). Clear communication of the value and importance of DEI, as well as respect for all contributions in a workforce, is also crucial. A recent study of state Departments of Transportation found that the most effective strategies for attracting and retaining women and other underrepresented groups shared champions at all levels, especially in top leadership, and clearly communicated organizational values and commitments related to DEI (Ivey, et al., 2021). Beyond simply having leadership championing DEI, progress must be tracked and leadership at all levels held accountable for gender parity and cultural transformation (Christiansen, 2024). Another effective practice to support inclusive culture is intentional, agency-wide training that goes beyond "checking the box" to engage employees in conversations and demonstrations of the value of DEI (National Academies of Sciences, Engineering, and Medicine., 2022; Ivey, et al., 2021). Training programs should ensure unconscious bias is examined and addressed and the value of DEI is clearly communicated (O'Brien, Hanlon, & Apostolopoulous, 2023).

Another element that is important for achieving gender diversity is providing flexibility and support for work-life balance (National Academies of Sciences, Engineering, and Medicine., 2022; FP Analytics, 2020). While this is key for attracting and retaining women, it is also important for

attracting and retaining all employees (McKinsey & Co., 2023a). Providing deliberate opportunities for flexible work arrangements and balance creates positive perceptions of employers and engages workers who might not otherwise find their fit within a company (Gallup, 2016; Godfrey & Bertini, 2019).

Creating mentorship and succession planning programs that are intentionally inclusive of women is another strategy that can prevent the "broken rung" challenge with women exiting transportation organizations and the industry at mid-career (National Academies of Sciences, Engineering, and Medicine, 2024; National Academies of Sciences, Engineering, and Medicine., 2022; O'Brien, Hanlon, & Apostolopoulous, 2023; FP Analytics, 2020; Godfrey & Bertini, 2019). The Texas Department of Transportation has found success in implementing such a program after identifying this trend. They have established a tracking system within the organization that identifies roles where there is a significant decline in representation of women from entry to mid-career. This strategy has enabled the organization to not only recognize problems with specific occupations but to also be proactive in developing interventions to address them (National Academies of Sciences, Engineering, and Medicine, 2024).

While the strategies described here are especially important for attracting, retaining, and advancing women within transportation, the effort is not solely beneficial to women. These approaches create a positive environment for all individuals. And, when more inclusive cultures are established, all employees realize greater job satisfaction and organizations reap the benefits across the board. It is also important to consider a holistic approach across the organization rather than siloed efforts for the greatest impact (Godfrey & Bertini, 2019).

3.6 Opportunities for the Future

Attracting and retaining a diverse workforce is imperative for the future whether considering the need for diverse perspectives to solve increasingly complex challenges or for a robust applicant pool. The population in the United States and globally is increasingly diverse. In the U.S., as much as 20 % of the population is neurodiverse, and this percentage is expected to rise as awareness increases diagnoses (Mahto, Hogan, & Sniderman, 2022). The population is also aging, a trend that will also continue, creating an environment where more generations are in the workforce at the same time than ever before (Pearce, 2024). The fact that the United States is projected to no longer have a racial or ethnic majority by 2045 also signifies a demographic shift (Frey, 2020). These changes in population characteristics mean that not only do employers need to consider how to move toward gender parity, but they must also take intentional steps to ensure intersectionality is top of mind in developing successful strategies and interventions. Companies that are strategic and proactive in such efforts will capitalize on the opportunity to engage larger segments of the population.

Additional opportunities for the transportation industry arise in changing the conversation about transportation jobs and their impact. As sustainability is increasingly of interest to new generations

of workers, especially women, the industry has the opportunity to showcase the significant impact that can be made through transportation (The Conference Board, 2024). Greater inclusion of women, especially in leadership roles, translates to positive corporate outcomes related to environmental impact and sustainability, creating another positive implication for doing so (FP Analytics, 2020). Finally, the rapidly changing landscape of technology is changing the way work is done in transportation arguably at a greater rate than many other industries. This not only creates an opportunity to shift conversations away from negative perceptions of the industry to highlight the exciting opportunities that also make work more accessible (Barrientos, 2019), but to also harness technology, such as AI, to support inclusive recruitment practices (SHRM, 2024). Because the increased integration of advanced technologies is shifting skill requirements to include more technical/STEM-oriented knowledge, skills, and abilities, this also means more concerted efforts need to be made to engage young women in STEM and address the gender gap (KPMG, 2024; Gartner, Inc., 2023; National Academies of Sciences, Engineering, and Medicine., 2022). AI can be used not only to develop more inclusive recruitment messaging but can also be used to remove implicit bias from the applicant screening process (SHRM, 2024). However, the caveat is that the reverse can also happen if datasets used for training algorithms are biased (Grensing-Pophal, 2024).

3.7 Summary of Findings

While the percentage of women in the transportation industry has increased in the past decade, women remain underrepresented throughout the industry, including being underrepresented in leadership roles. The literature confirms that while some sectors of the transportation industry have better female representation than others, most modes within the transportation industry remain male dominated, and in many cases the data is not even available to fully measure this lack of representation.

There are incredible motivations for greater gender diversity within an organization as it is linked to reduced employee turnover of both men and women, increased attractiveness to potential recruits, and greater job satisfaction, just to emphasize a few benefits. Despite the motivations that exist, there remain challenges to achieving gender parity within the industry. A lack of awareness of the benefits and opportunities in the transportation industry, a decreased sense of belonging that exists due to minimal gender representation, and challenges with intersectionality continue to hinder gender diversity efforts in the transportation industry.

Despite the undeniable challenges, there are successful strategies for increasing gender diversity in transportation that were identified. Outreach to encourage future generations to choose transportation career paths is repeatedly recognized as a beneficial strategy to increase gender diversity. Sense of belonging is a key aspect determining whether a person chooses to remain in the industry in which they are currently employed, and thus mentorship and employee resource groups have been touted as beneficial investments in fostering a culture of inclusivity and belonging among employees. As the diversity of the population continues to increase, the workforce should

also increase in diversity, leading to increased opportunities for improvement in the future. Harnessing the ever-changing landscape of the transportation industry as a driver of diversity has the potential to benefit the transportation workforce significantly.

These findings outline the business case for gender diversity, key barriers, and potential strategies to accelerate more inclusive representation in the workforce. Notably, organizations must approach gender balance with intentionality and with a holistic strategy to achieve the greatest success. However, while a significant body of literature exists regarding the experience of women more broadly in the workforce, more insight is needed for the transportation industry specifically.

4. Transportation Industry Survey

4.1 Survey Description

To address the data gaps highlighted in the literature review, especially the lack of transportation-specific insight, a survey was developed with the goal of understanding women's perspectives related to support for professional growth, corporate culture, sense of belonging within work environment, and sense of belonging within the transportation industry. The literature review revealed there is a need to better understand these topics, and the research team collaborated with WTS representatives to ensure the survey instrument included pertinent questions and response options. The survey contained 25 items, including demographic and attitudinal assessment questions. The survey was developed within the Qualtrics platform. A copy of the survey questionnaire is provided in Appendix A.

4.2 Dissemination Methodology

With a deliberate goal of obtaining women's perspectives in a male-dominated industry, the survey distribution relied upon allies within WTS to distribute the call for survey responses. In addition, researchers used social media posts on LinkedIn to solicit survey responses. A final dissemination method was included as the project was discussed at various conferences and webinars, where researchers used the opportunity to encourage all attendees to scan the Quick Response (QR) code that led to the survey to increase participation. The survey was distributed for a three-month data collection period, which concluded in July 2024, resulting in 996 usable survey responses.

4.3 Respondent Demographics

As the primary purpose of this research is to better understand gendered differences in experiences in the transportation industry, the gender demographic category was of greatest interest. Of the survey respondents, 80 % are female, 14 % are male, and 7 % identify some other way. Survey respondents were provided the option of female, male, genderqueer or genderfluid, nonbinary, transgender man, transgender woman, two-spirit, and some other way. Due to limitations with sample size, all responses that were not female or male were included as one 'all else' category.

Survey participants reported career paths in a range of modes, such as transit, highway, aviation, maritime, micromobility, freight, and active transportation, although the majority of participants indicated being part of the highway or transit industries, as shown in Figure 13. Participants were allowed to select more than one mode if appropriate to describe their job. The majority (53%) of survey respondents indicated being employed in the public sector, while 37% indicated private sector and the remaining 10% indicated academia or non-profit employment.

Figure 13. Transportation Mode(s) Represented by Survey Respondents
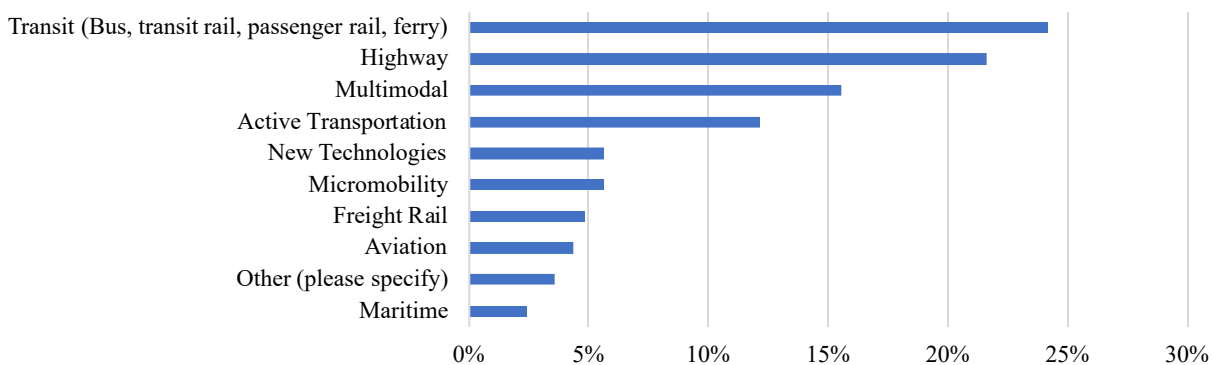
Respondents represented a range of occupations, as shown in Figure 14, with engineering and planning being the most frequently reported, followed by executive/senior management. These three categories accounted for occupations of 57% of survey respondents. The remaining 43% reported occupations such as administrative, research, communications, human resources, or IT along with construction or operations positions. Participants were evenly distributed in terms of the amount of time they had been in the industry, with 22% reporting less than 5 years, 24% between 5 and 10 years, 26% between 10 and 20 years, and 28% more than 20 years. Because the respondents were fairly diverse in terms of background and time within the industry, results are expected to be reasonably representative of the range of transportation industry workers from these perspectives.

Figure 14. Occupations of Survey Participants
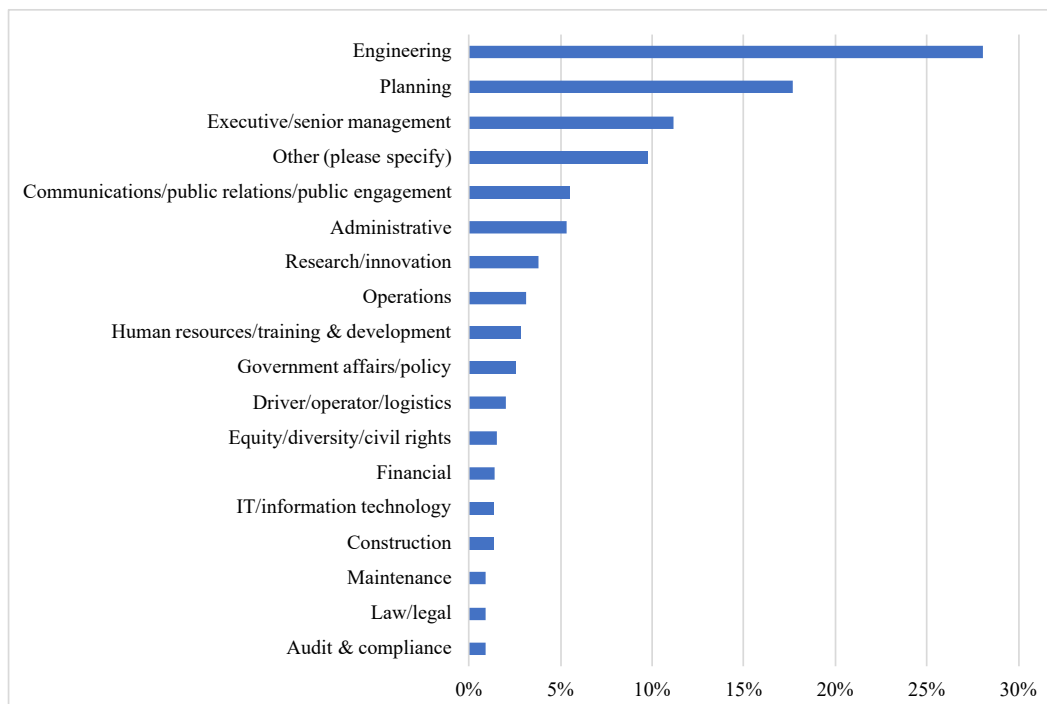
4.4 Limitations

Recognizing the 14% male sample size, the researchers acknowledge the opportunity for sampling bias when using industry organizations that are heavily female to encourage a higher female response rate. Future surveys may also benefit from convincing other, non-gendered industry organizations to join the survey distribution efforts to increase the response rates for males and improve the ability to make appropriate comparisons. Study results may also benefit by utilizing organizations that encourage participation from genderqueer or genderfluid, nonbinary, transgender man, transgender woman, and two-spirit individuals to increase their response rates as well. Additionally, public sector transportation workers are overrepresented in this study as compared to private sector workers. Because examination of responses between participants in these categories did not reveal statistically significant differences, it is not expected that this overrepresentation significantly impacts our findings. Further, the research team had limited control over who responded to the survey because of the dissemination methodology. This leaves the potential for sampling bias due to the reach of those sharing the opportunity via email or social media and the impact of algorithms on who might see social media posts. Because the survey was voluntary, the potential for self-selection bias also exists.

4.5 Results and Discussion

For each survey item, differences were investigated between gender categories using a comparison of proportions, with the threshold for statistical significance being $p = 0.10$. While there were apparent differences or trends in participants' responses based on identification as male, female, or all other gender responses, only a few of the survey items had statistically significant differences in responses between gender groups. Because of the low number of responses from participants identifying their gender as something other than male or female, statistical testing was only conducted between the male/female gender groups. Survey participants were asked to indicate whether they agreed with a series of items related to:

- Support for professional growth

- Corporate culture

- Sense of belonging within work environment

- Sense of belonging within the transportation industry

For each topic, survey participants were presented with a series of 7–8 statements and were asked to consider their degree of agreement or disagreement with each (agree, neither agree nor disagree, disagree).

4.5.1 Support for Professional Growth

The "support for professional growth" category of statements showed the greatest differences among responses analyzed by gender (male/female). Statistically significant differences were found for each of the following statements:

- I have a firm idea of how I want my career to advance and specific career goals. ($p = 0.01$)

- I have someone in my organization that is invested in my career growth and success. ($p = 0.09$)

- I have the same opportunity for growth and advancement as others in my company/organization. ($p = 0.02$)

Figures 15–17 present the results for each of these statements for respondents identifying as male, female, and all other gender categories. Respondents identifying as female were less likely to agree that they have a clear set of career goals and have the same opportunity for growth and advancement as others in their company or organization than those identifying as male. Respondents identifying with gender categories other than male or female reported the lowest level of agreement related to having the same opportunity for growth and advancement as others in their organization. Interestingly, while female respondents had more negative perceptions regarding professional growth opportunities than did males, they were also more likely to indicate that there was someone within their organization who was invested in their success than male respondents. Similarly, respondents of other gender identities had a higher percentage of agreement with this statement.

Figure 15. Percentage Agreement by Gender Category: Career Goals

I HAVE A FIRM IDEA OF HOW I WANT MY CAREER TO ADVANCE AND SPECIFIC CAREER GOALS.

■ Male% ■ Female% ■ All Else

	AGREE	DISAGREE	NEITHER
Male%	69%	4%	27%
Female%	57%	10%	17%
All Else	62%	24%	15%

Figure 16. Percentage Agreement by Gender Category: Internal Investment in Career Success
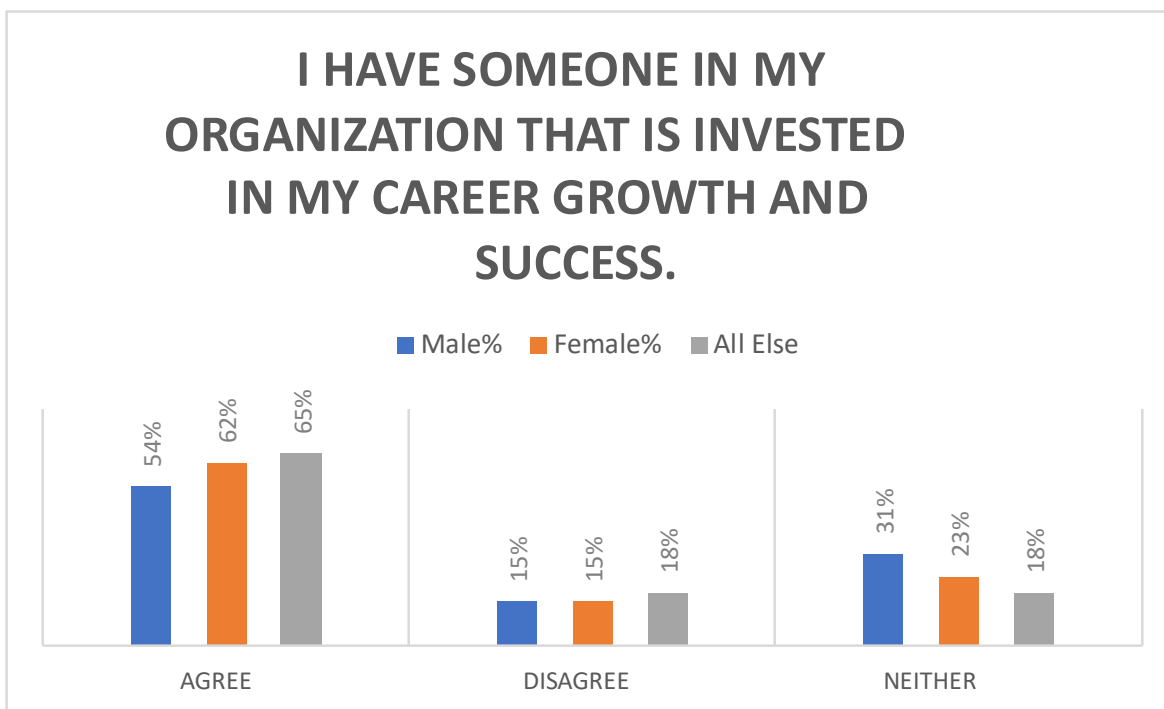
I HAVE SOMEONE IN MY ORGANIZATION THAT IS INVESTED IN MY CAREER GROWTH AND SUCCESS.

■ Male% ■ Female% ■ All Else

	AGREE	DISAGREE	NEITHER
Male%	54%	15%	31%
Female%	62%	15%	23%
All Else	65%	18%	18%

I HAVE THE SAME OPPORTUNITY TO GROW AND ADVANCE AS OTHERS IN MY COMPANY/ORGANIZATION.

■ Male%   ■ Female%   ■ All Else

	AGREE	DISAGREE	NEITHER
Male%	68%	16%	16%
Female%	57%	21%	22%
All Else	41%	32%	26%
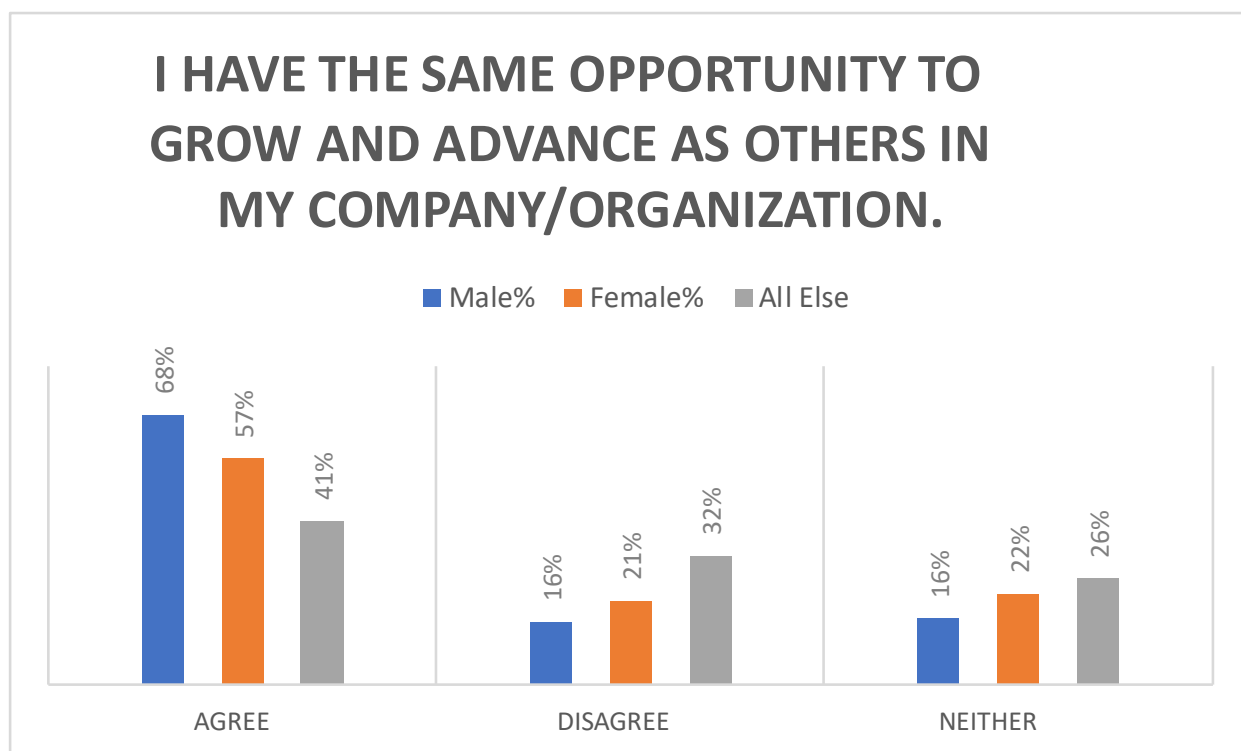
Black, Indigenous, Hispanic, Asian, and other women of color (BIPOC) had markedly different perspectives than did white women who responded to this study, with statistically significant differences, indicated in bold font, for multiple items as shown in the Tables. Again, a p-value of 0.10 was used as the threshold for statistical significance. Women of color were less likely to agree than white women that they are growing professionally and have the opportunity to do challenging things at work. White women, however, were less likely to indicate that they had a firm idea of how they want their career to advance. Women of color were less likely than white women to believe they have someone within their organization that is invested in their career growth and success and that they have the same opportunity to grow and advance as others in the company.

Table 1. Comparison of Responses Between White Women and Women of Color
Professional Growth

Survey Statement	%Agree – White Women	%Agree – BIPOC	p-value
I am growing professionally.	**85%**	**80%**	**0.05**
I have the opportunity to do challenging things at work.	**89%**	**83%**	**0.01**
I have a firm idea of how I want my career to advance and specific career goals.	**55%**	**62%**	**0.05**
I have someone in my organization that is invested in my career growth and success.	**65%**	**57%**	**0.05**
I have someone outside of my organization that is invested in my career growth and success.	52%	52%	0.96
I see a path for me to advance my career in my company/organization.	54%	51%	0.41
I have the same opportunity to grow and advance as others in my company/organization.	**60%**	**51%**	**0.01**
I have the opportunity to showcase my talents in my company/organization.	75%	70%	0.18

4.5.2 Corporate Culture

For the series of statements related to corporate culture, only one item had a statistically significant difference in percentage agreement between male and female respondents. Participants identifying as female were more likely to agree with the statement, "Racial, ethnic, sexual, and gender-based jokes or slurs are not tolerated at this organization," than those identifying as male (p = 0.09), as shown in Figure 18. This may indicate that these types of jokes or slurs may be shared more frequently between men when women are not present. While not meeting the threshold for statistical significance, there were generally more negative trends in responses of females as compared to males for several other items in this category as shown in Figures 19–21. Survey participants identifying as female were less likely to agree that the leadership of their organization encourages diversity and invests financial resources in DEI efforts. Female respondents were also more likely to agree that they had experienced or witnessed discrimination within their company or organization. Further, these negative trends were even more apparent for survey participants identifying as genders other than male or female.

Figure 18. Percentage Agreement by Gender Category: Racial, Ethnic, Sexual, and Gender-Based Jokes Or Slurs Are Not Tolerated

RACIAL, ETHNIC, SEXUAL, AND GENDER -BASED JOKES OR SLURS ARE NOT TOLERATED AT THIS ORGANIZATION.

■ Male ■ Female ■ All Else

	AGREE	DISAGREE	NEITHER
Male	76%	6%	18%
Female	83%	5%	12%
All Else	68%	21%	12%
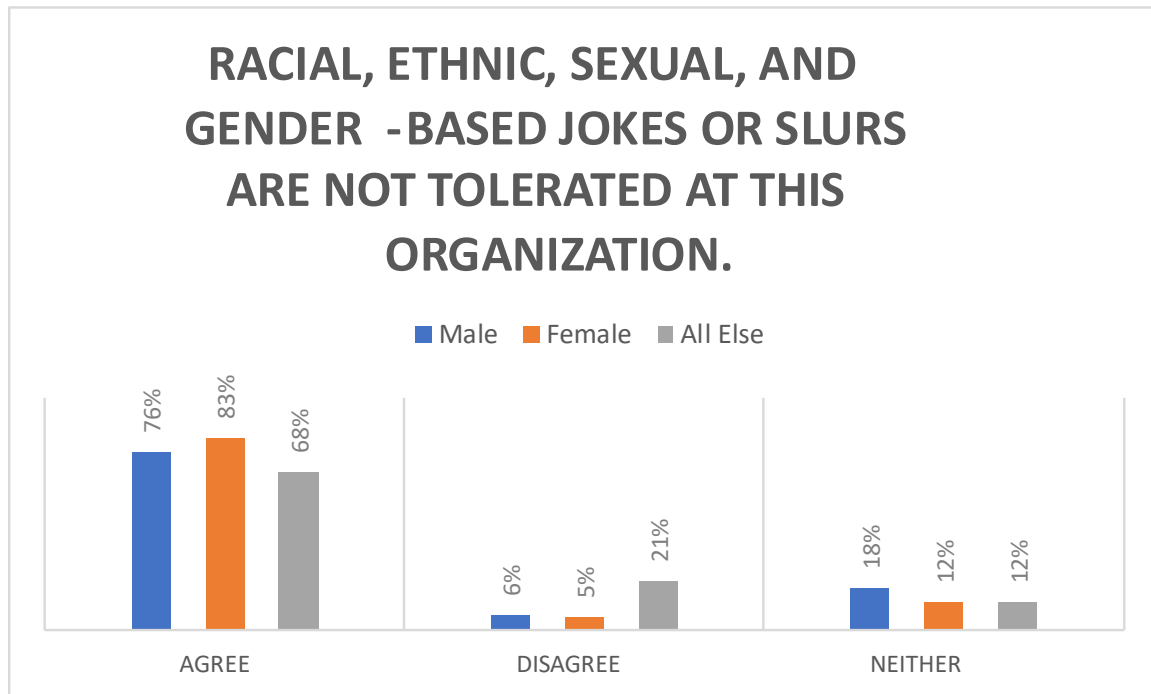
Figure 19. Percentage Agreement by Gender Category: Company Leadership Encourages Diversity

THE LEADERSHIP OF MY COMPANY/ORGANIZATION ENCOURAGES DIVERSITY.

■ Male ■ Female ■ All Else

	AGREE	DISAGREE	NEITHER
Male	77%	4%	19%
Female	71%	7%	22%
All Else	50%	26%	24%
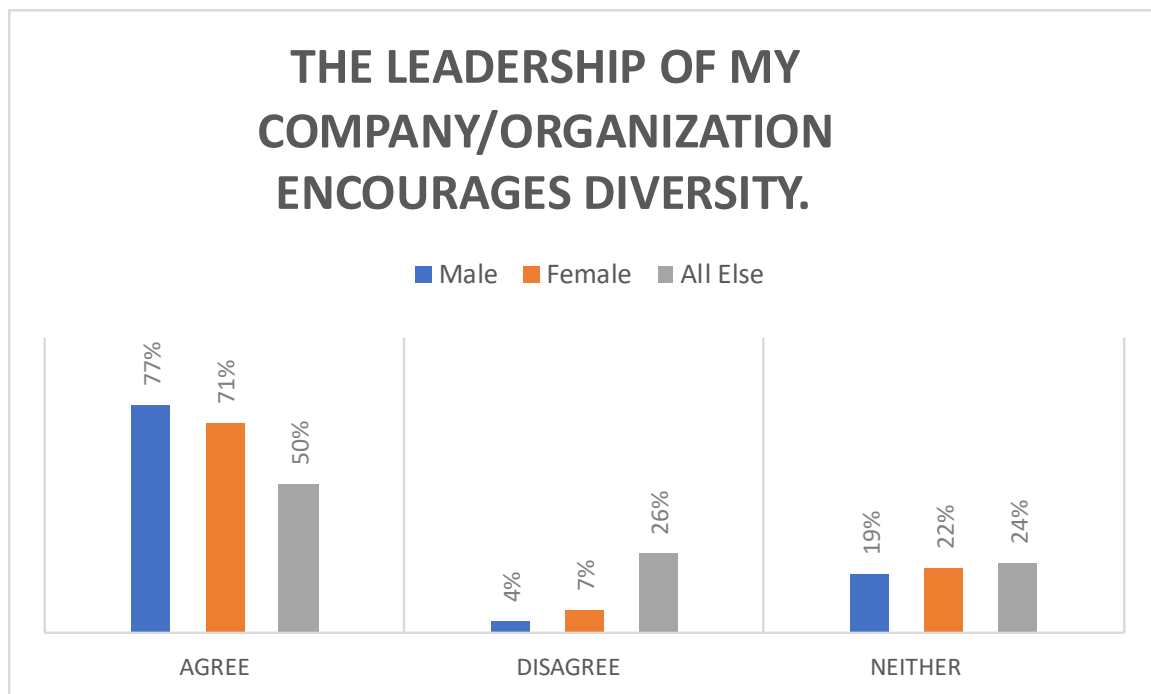
Figure 20. Percentage Agreement by Gender Category: Company Leadership Invests in DEI

THE LEADERSHIP INVESTS FINANCIAL RESOURCES IN DEI EFFORTS.

■ Male ■ Female ■ All Else

	AGREE	DISAGREE	NEITHER
Male	66%	7%	27%
Female	60%	12%	28%
All Else	50%	29%	21%

Figure 21. Percentage Agreement by Gender Category: Experiencing or Witnessing Discrimination within Company

I HAVE PERSONALLY EXPERIENCED OR WITNESSED DISCRIMINATION IN MY COMPANY/ORGANIZATION.

■ Male ■ Female ■ All Else

	AGREE	DISAGREE	NEITHER
Male	24%	57%	19%
Female	31%	56%	14%
All Else	53%	15%	32%

There were several significant differences within this category of responses between white women and Black, Indigenous, Hispanic, Asian, and other women of color. Women of color were significantly less likely than white women to agree that the leadership of their company or organization invests financial resources into DEI efforts. They were also substantially more likely to report that they had personally experienced or witnessed both discrimination and harassment within their organization. It is also important to note that survey participants identifying as a gender other than male or female reported experiencing or witnessing discrimination at a rate more than twice that of male respondents and 22% higher than that of female respondents.

Table 2. Comparison of Responses Between White Women and Women of Color – Corporate Culture

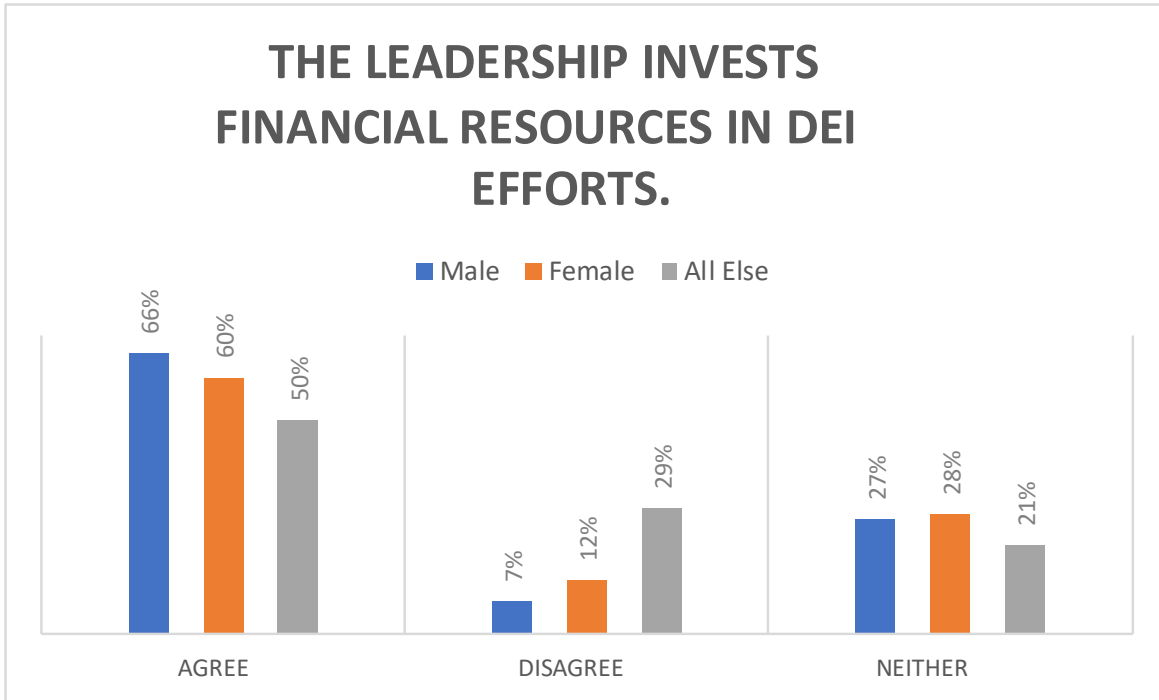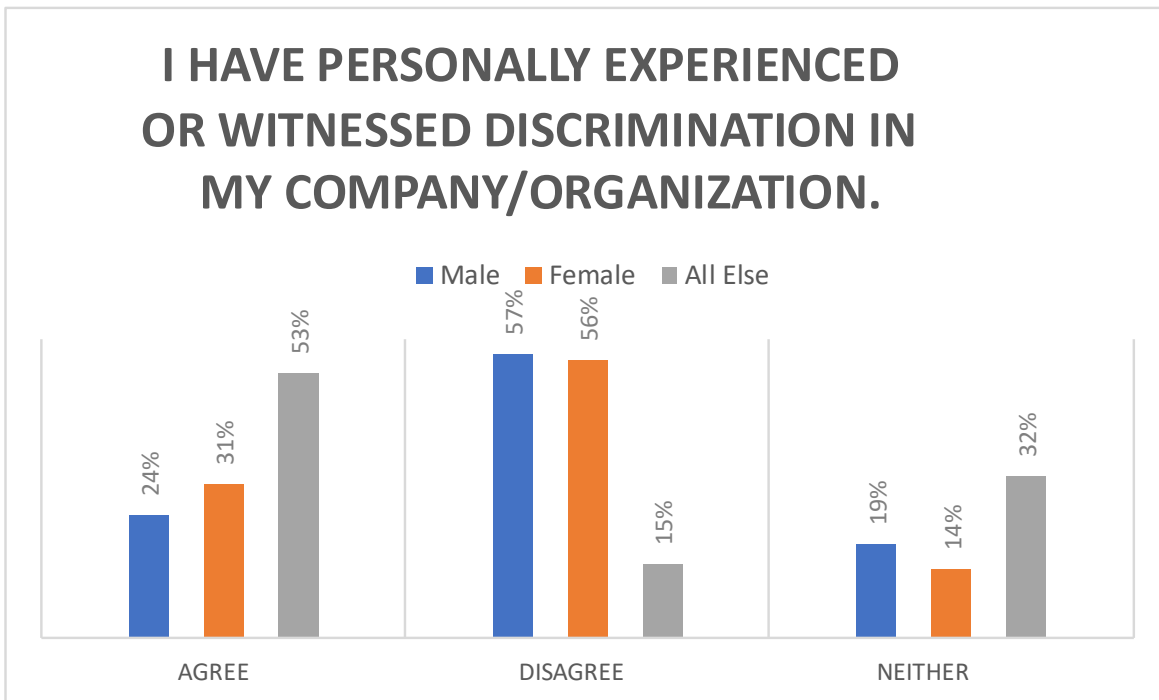| Survey Statement	%Agree – White Women	%Agree – BIPOC	p-value
The leadership of my company/organization encourages diversity.	72%	69%	0.40
My organization clearly communicates the value of a diverse and inclusive workplace policies.	68%	64%	0.23
This company respects individuals and values their differences.	71%	68%	0.37
At this company, employees appreciate others whose backgrounds, beliefs, ... differ.	68%	68%	0.98
Racial, ethnic, sexual, and gender-based jokes or slurs are not tolerated at this organization.	83%	81%	0.46
The leadership invests financial resources in DEI efforts.	**63%**	**54%**	**0.02**
I have personally experienced or witnessed discrimination in my company/organization.	**26%**	**39%**	**0.00**
I have personally experienced or witnessed harassment in my company/organization.	**21%**	**32%**	**0.00**

4.5.3 Sense of Belonging in Work Environment

In terms of sense of belonging within the company or organization where a respondent worked, there were no significant differences between responses by male/female gender category for most items. However, participants identifying as female were significantly more likely to agree (p = 0.09) with the statement, "I am just as capable as peers in my company/organization," than those identifying as male, as shown in Figure 22. Differences were observed between responses of white women and Black, Indigenous, Hispanic, Asian, and other women of color for several items in this category. Women of color were less likely to report that they could see themselves working at their

current company long-term and that they had the same growth opportunities as their peers, as shown in Table 3.

Figure 22. Percentage Agreement by Gender Category: Perception of Personal Capability

I AM JUST AS CAPABLE AS MY PEERS IN MY COMPANY/ORGANIZATION.

- Male
- Female
- All Else

	AGREE	DISAGREE	NEITHER
Male	86%	4%	10%
Female	92%	1%	7%
All Else	94%	3%	3%
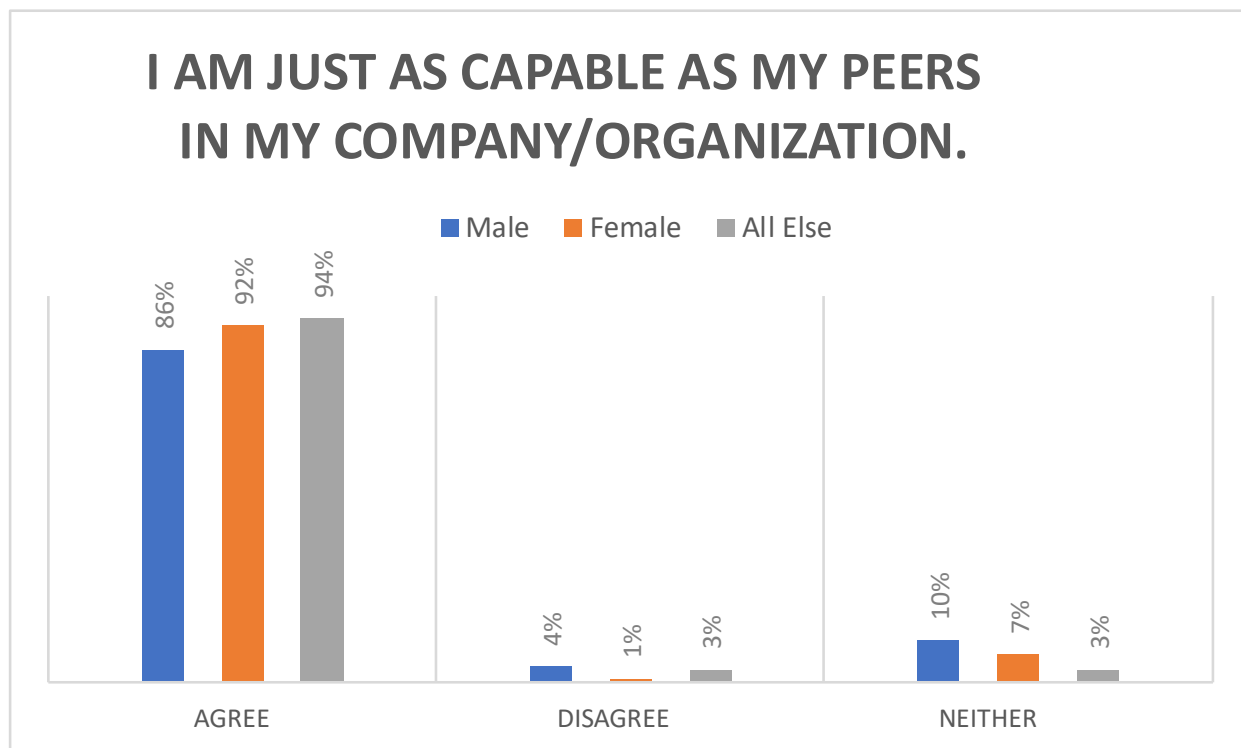
Table 3. Comparison of Responses Between White Women and Women of Color – Sense of Belonging in Work Environment

Survey Statement	%Agree – White Women	%Agree – BIPOC	p-value
I have strong ties with my peers in my company/organization.	70%	67%	0.42
I am proud to work for my company/organization.	81%	80%	0.87
I often talk with friends and family about my company/organization and our….	67%	65%	0.55
I share skills, background, and interests with my peers in this company/org….	81%	79%	0.60
I am just as capable as my peers in my company/organization.	94%	91%	0.14
I can see myself working at this company/organization long-term.	**72%**	**63%**	**0.02**
I have the same growth opportunities as my peers in my organization.	**60%**	**52%**	**0.05**

4.5.4 Sense of Belonging in the Transportation Industry

For the items related to sense of belonging in the transportation industry, female participants were more likely (p = 0.03) to agree that "I can see myself working in the transportation industry long-term," than male participants, as shown in Figure 23. Survey respondents identifying with genders other than male/female more frequently disagreed with this statement. While not a statistically significant difference, female respondents were more likely than respondents from other gender categories to agree with the statement, "I am proud that I am a member of the transportation industry," as shown in Figure 24. Very few male/female survey respondents disagreed with this statement, however nearly a quarter of respondents of other gender identities disagreed. Differences were once again observed between responses of white women and Black, Indigenous, Hispanic, Asian, and other women of color for several items in this category, as shown in Table 4.

Figure 23. Percentage Agreement by Gender Category: Long-Term Connection to Industry

Figure 24. Percentage Agreement by Gender Category: Pride in Transportation Industry

I AM PROUD THAT I AM A MEMBER OF THE TRANSPORTATION INDUSTRY

■ Male ■ Female ■ All Else

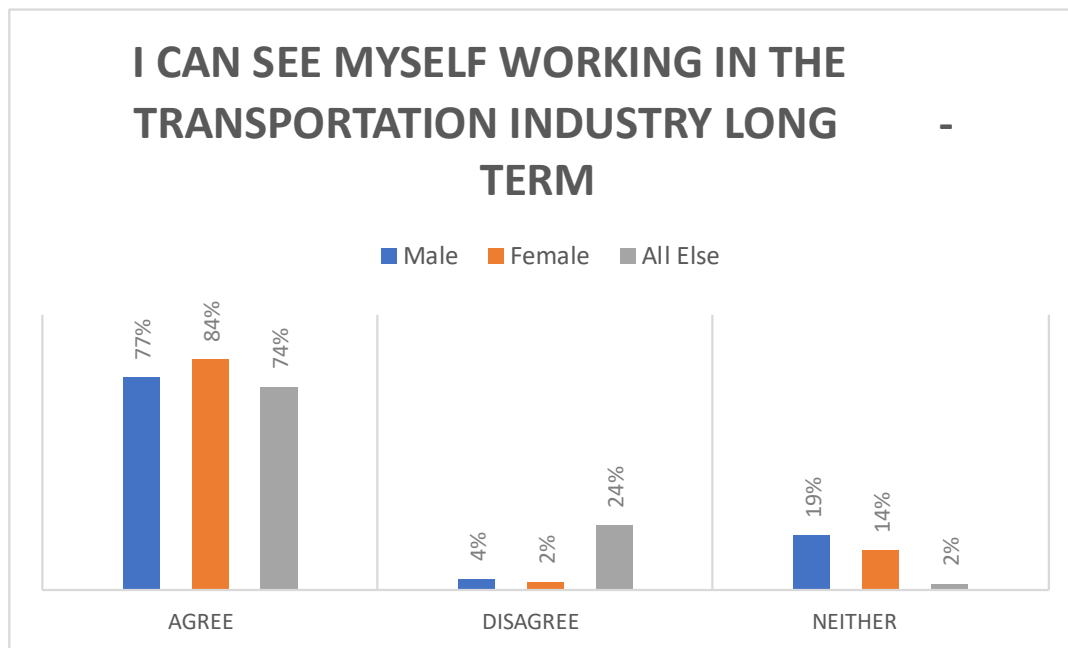|	AGREE	DISAGREE	NEITHER
Male	83%	3%	14%
Female	88%	2%	11%
All Else	68%	32%	0%
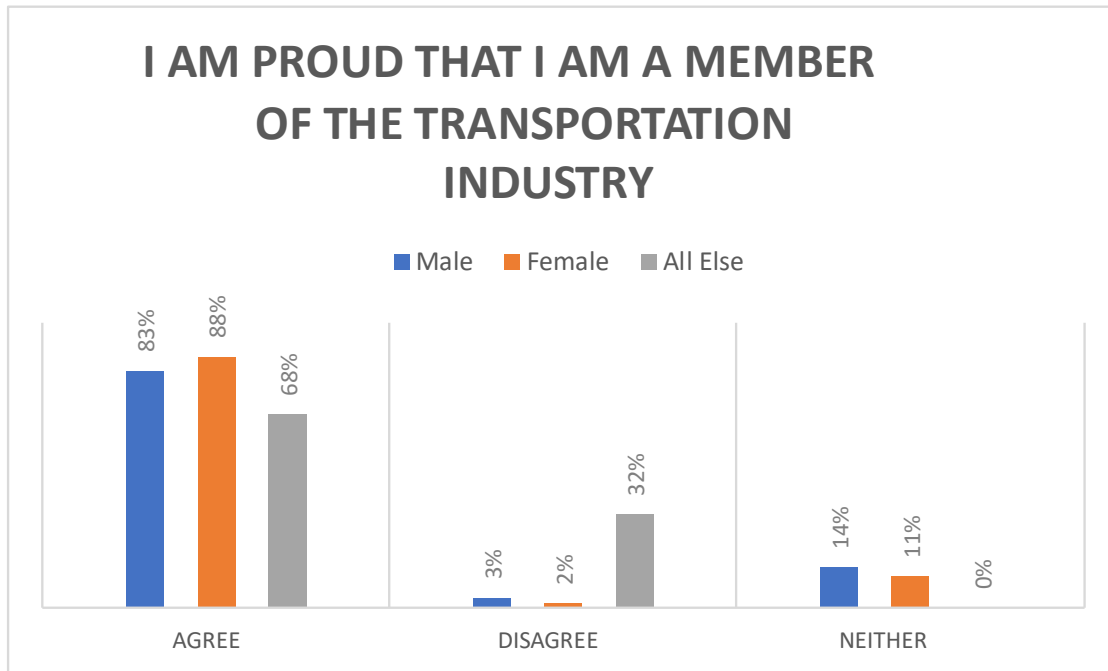
Table 4. Comparison of Responses Between White Women and Women of Color – Sense of Belonging in Transportation Industry

Survey Statement	%Agree – White Women	%Agree – BIPOC	p-value
I have strong ties with members of the transportation industry.	61%	57%	0.34
I am proud that I am a member of the transportation industry.	**90%**	**83%**	**0.00**
I often talk with friends and family about the transportation industry and our mission.	76%	74%	0.44
I share skills, background, and interests with my peers in the transportation industry.	77%	75%	0.54
I am just as capable as my peers in the transportation industry.	87%	84%	0.22
I can see myself working in the transportation industry long-term.	**88%**	**77%**	**0.00**
I have a similar growth potential as my peers in the transportation industry.	**67%**	**58%**	**0.02**

Black, Indigenous, Hispanic, Asian, and other women of color were significantly less likely than white women to indicate they are proud to be part of the transportation industry, they can see themselves in the industry long-term, and they have similar growth potential as their peers within the industry.

Survey participants were also asked to rate, on a scale of 1 to 5, their overall satisfaction with being a member of the transportation industry, with 5 being extremely satisfied and 1 being extremely dissatisfied. Responses for those identifying as male and female were very similar, while those identifying with other gender categories indicated somewhat less satisfaction, as shown in Figure 25. There were no differences in responses between white women and women of color for this item. Finally, survey participants were asked to share the first word that came to mind when they thought about the transportation industry. Responses are shown in Figure 26 for male and Figure 27 for female participants. Respondents identifying as male more frequently used words such as "infrastructure, necessary, and service" while respondents identifying as female more frequently used "movement, community, opportunity, innovation, and mobility." The terms reported more frequently by male respondents focus more on the traditional concepts of transportation while terms reported more frequently by female respondents appear to be oriented more toward industry advances and societal impacts. This indicates that the messaging behind career pathway or job opportunities should include a focus on some of the more exciting developments and community impacts in addition to traditional messaging about transportation infrastructure in order to appeal to all genders. Respondents of both genders frequently used the words "safe" or "safety," indicating a shared perspective on the importance of safety within the industry.

Figure 25. Satisfaction with Transportation Industry

OVERALL SATISFACTION WITH BEING A MEMBER OF THE TRANSPORTATION INDUSTRY

MALE — 4.19
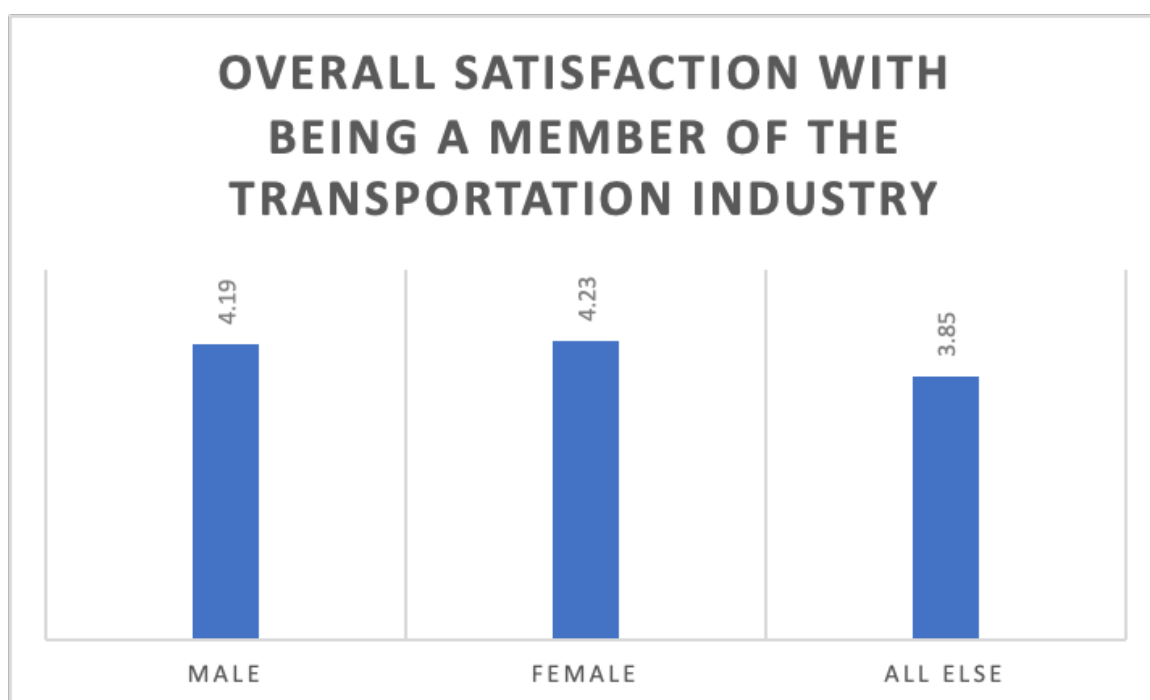FEMALE — 4.23
ALL ELSE — 3.85

Figure 26. First Word that Comes to Mind when Thinking about Transportation Industry:
Male Respondents

Figure 27. First Word that Comes to Mind when Thinking about Transportation Industry:
Female Respondents

5. Interviews

5.1 Description of Interview Purpose and Questionnaire Items

While the primary data collection methods for this research focused on the literature review and the survey response analysis, there were some additional gaps that the research team sought to fill through individual interviews to deepen the understanding of critical issues and potential solutions for increasing representation of women in the transportation workforce.

The interviews were semi-structured and followed a general guideline of interview questions, though the interview style was more of a conversation than a direct question and response. A questionnaire was developed by the research team to obtain greater insight into barriers to increased representation of women as well as identification of effective practices that lead to increased retention and more inclusive workplace culture. The questionnaire was reviewed by the project's advisory panel and refined prior to its use.

Demographic data collected via the interview included job titles, number of years in the industry, gender, race/ethnicity, and educational background. Interview participants were asked what attracted them to the transportation industry, how they obtained their first transportation job, how they moved up the ranks in their career, and why they stayed in the transportation industry. These introductory questions and the conversational flow were intended to make interview participants feel comfortable sharing their candid views and feelings. The main information that was gleaned from the participants that provided insight to this study revolved around their views on the primary barriers to achieving gender parity and the strategies or initiatives they might suggest for attracting and retaining a more balanced gender representation in the transportation industry. The findings that are identified in this chapter of the report are constructed from the interview responses, with all personally identifying information removed. A copy of the interview questionnaire is provided in Appendix B.

5.2 Invitation Strategy

To ensure the research team selected a diverse set of candidates to interview, a list of potential candidates was developed by the research team and the advisory panel. The potential candidates were categorized by their area of expertise within the transportation industry, such as transit, highway, aviation, maritime, micromobility, new technology, freight rail, multimodal, and active transportation. Additionally, diversity in terms of point in the career path was also desired. The research team worked with WTS International Leadership to help define potential interview participants in each of these categories. Through targeted email invitations, the 15 interview participants agreed to participate in interviews with at least one member of the research team. Most interviews were conducted virtually, though some interviews were conducted in a face-to-face setting.

5.3 Respondent Demographics

A total of 15 interviews were conducted, of which 87 % of interview participants were female and 13 % were male. The male perspective was included to better understand similarities and differences in perspectives. The interview participants were diverse in their ethnicities, with 46 % identifying as non-white. In terms of subject matter expertise, the interview participants were also diverse:

- *Active Transportation*   *2 interview participants*

- *Aviation*   *2 interview participants*

- *Freight Rail*   *1 interview participants*

- *Graduate Student*   *1 interview participants*

- *Highway*   *2 interview participants*

- *Maritime*   *1 interview participants*

- *Micromobility*   *1 interview participants*

- *Multimodal*   *2 interview participants*

- *New Tech*   *1 interview participants*

- *Transit*   *2 interview participants*

5.4 Synthesis of Findings

The interviews takeaways are mostly focused on the primary barriers to achieving a more balanced gender representation in the transportation industry and the strategies or initiatives for attracting and retaining diverse representation. Interestingly, there were no striking differences in perspectives between participants who have been in the industry 15+ years than those who are newer entrants, nor between male and female participants' responses. However, there were more descriptions of barriers for women by those in engineering and logistics roles versus those in planning occupations. One interesting observation from the collection of responses related to each participant's journey into and throughout the transportation industry is the general similarities that most women reveal regarding how their careers transition from student to more senior roles, including careers that flourish despite self-doubt and sponsors that have served as champions for them when they weren't in the room to fight for themselves. These similarities among successful women serve as proof to the next generation of women leaders that success does not rely solely on

self-assurance, and capabilities consistently surpass personal expectations when coupled with support and guidance.

5.4.1 Primary Barriers

Key barrier themes that resonated through the interviews centered around fear and ignorance pertaining to the inclusion of women. For instance, fears that providing women a due benefit may result in eliminating men's benefits, or fears that including women in a meeting may undermine the men's authority in that meeting were noted as prevalent barriers and are detrimental for the inclusion of women in any male-dominated industry. It was also noted that there may sometimes be a misunderstanding about what women are willing to do in their careers and what efforts women want to invest. These perceptions are centered around old-school mindsets and attitudes. Put in simpler terms, sexism is still present in the transportation industry. Additionally, sexism is often the result of unconscious bias, and thus it is difficult to manage its consequences when the mechanisms for recognizing it are not in place.

Further, there is often a mismatch in terms of organizational "carrots" and benefits that are actually appealing to women. Frequently, organizations try to motivate success in traditional ways, without recognizing that there are differences in motivating factors for different people. Women, people of diverse ethnicities, and younger generations often value different things than do those who have traditionally been engaged in the industry. This means that organizations that do not make an effort to understand these differences and design retention strategies and advancement pathways accordingly are likely to have limited success in retaining not just women but other underrepresented groups as well.

Another barrier some interview participants identified to achieving more balanced gender participation in the transportation industry revolved around the unjust culture that remains in existence today in some organizations. This again often stems from unconscious biases and reliance on stereotypes when establishing cultural norms. A shift from women-are-weaker to women-are-equal mindset is necessary from leadership to front-line. And, a culture of respect and value for all employees is imperative for a shift toward greater gender balance.

Without requirements for transparent data related to hiring and promotion decisions, a lack of accountability and limited understanding of the pervasiveness of biases that drive these decisions prevail. If organizations examined, tracked, and reported workforce demographics, specifically by position type and level, there would be a greater opportunity for accountability and increased incentives for leadership to invest in inclusive workforce efforts.

One incorrect assumption may be that there are not enough women in the pipeline for promotions. Interview discussions instead indicate the lack of women applying for promotion opportunities may be attributable to a lack of encouragement, a lack of understanding, or a misconception about the qualifications and responsibilities associated with the promotion. When managers or

supervisors are focused on developing and promoting all employees, the industry can perform better. It is beneficial when leadership develops every person in line with personal career goals and strengths, focusing on promoting the best person for a position. A big picture mentality that encourages aggressive career path opportunities for all genders is beneficial to both organizational and industry advancement.

Some interview participants mentioned that there is also a general fear of STEM apparent among the current generation of students that may discourage them from pursuing classes that are STEM focused. This points to a need to inform young people about the benefits and exciting opportunities within the transportation industry, inspiring investments in the courses that will develop their skillsets to prepare them for entering the transportation industry. It was emphasized in discussions that women of color are disproportionately impacted by fear of STEM or a general lack of awareness of opportunities. Thus, it is imperative that women of color are courted, trained, and invested to encourage them to consider these career paths. Further, the underrepresentation of women in general, and of women of color especially, is concerning as when women are able to see leaders that look like them, they are more likely to envision themselves in these roles.

5.4.2 Impactful Practices

Previous research in this area points to impactful ways to increase workforce participation, though measuring many of those approaches is not a simple task. For instance, connecting with young people is a valuable way to attract young minds into considering a career in the transportation industry (Bertini & Godfrey, 2019), but it is unlikely that anyone is counting the number of students they are talking to on a recurring basis unless their job focuses on collecting that information. It is not only difficult to measure the direct number of people reached, but it is also nearly impossible to collect information about how many of those people made a choice because of your actions. Similarly, encouraging young professionals to participate in professional organizations, especially encouraging them to run for leadership positions, provides a unique and valuable opportunity to improve confidence and increase their visibility in the industry, though confidence and visibility are not easily measured metrics.

While it is not necessarily easy to measure culture in an organization, there are some impactful practices that organizations in the transportation industry have put in place to create positive outcomes. First, leadership within an organization must understand the value of an investment in inclusivity, thus it is important to start with candid conversations that describe the reasons that gender balanced representation is imperative. Each person's ideas and perspectives are shaped by their life experiences. Women and men face vastly different challenges and obstacles, such as security concerns or more frequent travel with children or infants, when traveling, no matter the mode of transportation of choice. There are duties and considerations that vary by gender, generally, and when the people solving the transportation challenges are as diverse as the communities they are attempting to improve, then there is a much greater chance of truly understanding and mitigating the challenges at hand.

Interview participants noted that meaningful representation of women in all roles within an organization is one way that an organization can display their commitment towards constructive diversity. Having women represented in the C-suite, along with female representation on hiring panels, and women included in the decision-making processes of the organization allows meaningful representation, where women have the opportunity to influence change.

Investing in formal mentoring programs, and encouraging involvement in those programs through incentivization when possible, can lead to women perceiving that their organization is invested in their personal growth. There is real work necessary to develop and foster an inclusive culture, but the results of the hard work are plentiful. When policies allow flexible schedules and progressive family policies allow childcare, parent-care, and maternal and paternal leave, they are much more likely to attract rather than repel an applicant, regardless of their gender. Additionally, zero tolerance policies for inappropriate and misogynistic behaviors are one way to enforce appropriate behavior in the workplace.

It is imperative that, as an industry, the differences that exist in our workforce are embraced. Accommodation and support should be provided in response to personal needs to allow all employees to thrive, rather than trying to force the minority to conform to the needs of the majority. To accomplish this, training is necessary at all levels of an organization to encourage professionalism and define respectful workplace practices to ensure that everyone is aware of the way their actions may make others feel. Many of the misogynistic thoughts and behaviors are rooted in the ways others were raised, and repeated training may be necessary to create lasting change.

Finally, encouraging young and wondering minds about the abundant opportunities in the transportation industry cannot be understated as pivotal to increasing the number of women that are attracted to the transportation industry. As young as elementary school, children are exploring the career options they want to pursue. While not an immediate return on investment, when considering the long-term dividends of investing in the next generation of transportation professionals, there is the potential to dramatically improve the gender balance of the transportation industry.

6. Summary and Conclusions

The conclusions and recommendations in this report are derived from the extensive literature review, responses from the survey of the transportation industry, and responses from interviews with various transportation professionals. The literature review indicates that while representation of women has increased over the last several decades, women remain underrepresented throughout the industry, especially in leadership roles. The literature confirms that while some sectors of the transportation industry have better female representation than others, most modes within the transportation industry remain male dominated, and in many cases the data is not even available to accurately measure the lack of representation.

6.1 Findings

Numerous studies show that there are incredible motivations for greater gender diversity within an organization. Diversity is linked to reduced employee turnover, increased attractiveness to potential recruits, and greater job satisfaction. Reduced employee turnover benefits an organization by lowering the need for onboarding and minimizing knowledge loss, both of which can be extremely costly. Despite the motivations that exist, there remain challenges to achieving gender parity within the industry. A lack of awareness of the benefits and opportunities in the transportation industry, a decreased sense of belonging that exists due to minimal gender representation, and challenges with intersectionality are all issues that continue to hinder efforts to achieve more balanced gender representation in the transportation industry.

Despite these challenges, there are also successful strategies for increasing gender diversity. Outreach to encourage future generations is repeatedly noted as a necessary strategy to increase gender diversity. A sense of belonging is a key determinant in whether a person chooses to remain in an industry, and thus mentorship and employee resource groups have been touted as beneficial investments in fostering a sense of belonging among employees. As the diversity of the population continues to increase, this gives rise to increased opportunities for improvement in the future. Leveraging the ever-changing landscape of the transportation industry in recruitment and retention efforts also stands to benefit the transportation workforce tremendously.

As the survey results are considered, it is important to recognize the 14% male sample size, which the researchers acknowledge provides the opportunity for sampling bias due to the use of industry organizations that are heavily female to encourage a higher female response rate. Future surveys may benefit from convincing other, non-gendered industry organizations to join the survey distribution efforts to increase the response rates for males and improve the ability to make more meaningful gender response comparisons. Study results may also benefit by utilizing organizations that encourage participation from genderqueer or genderfluid, nonbinary, transgender man, transgender woman, and two-spirit individuals to increase their response rates as well. Additionally, public sector transportation workers are overrepresented in this study as compared

to private sector workers. Because examination of responses between participants in these categories did not reveal statistically significant differences, it is not expected that this overrepresentation significantly impacts report findings, though future intentional outreach could target more private sector transportation industry professionals to reduce this overrepresentation.

Respondents identifying as female were less likely to agree that they have a firm idea of how they want their career to advance than male respondents. However, they were more likely to indicate that someone in their organization is invested in their career growth and success. This seemingly contradictory result may indicate that more targeted interventions and training for leaders and mentors are needed for investments to be effective. Or, it may indicate that a lack of alignment in personal values and goals with that of the organization is creating uncertainty for women regarding how (or whether) they want to advance as was noted in interview discussions. Career progression programs should also provide opportunities for career growth for employees that are not interested in the managing other employees. It is important to consider that not everyone wants to follow a managerial tract, but that lack of desire to be a manager does not diminish the desire to progress. Career progression programs should be nimble enough to appeal to all employees.

Respondents identifying as female were less likely to feel they have the same opportunity for growth and advancement as others in their company or organization than those identifying as male. With retention challenges rampant in the industry, it is imperative that transportation professionals have the opportunity for advancement, regardless of their gender. When employees perceive a lack of opportunity, their satisfaction and sense of belonging decreases. Alternatively, when employees feel like they are a beneficial asset in the organization and concurrently feel invested in, the culture is improved and job satisfaction increases.

Perceptions of limited opportunity for growth may be offset through the provision of intentional career development opportunities, such as access to training to increase skillsets and competencies, that are offered broadly to employees rather than just to those who managers perceive may be interested. This may in turn increase confidence and satisfaction within roles and organizations. Broken rung analyses allow organizations to proactively identify and intentionally address areas of challenge and can be effective for addressing advancement opportunity disparities.

While females generally had more negative trends in survey responses compared to males in survey responses across all categories, the discrepancies were even greater for women of color and those of other gender identities. This indicates that intersectionality and broad gender definitions must be considered by organizations as they design inclusive policies and programs, as those identifying in these ways experience greater challenges with professional growth, sense of belonging, and corporate culture.

Respondents identifying as male more frequently used words such as "infrastructure, necessary, and service" while respondents identifying as female more frequently used "movement, community, opportunity, innovation, and mobility" when describing the industry. These

differences may indicate a difference in values and motivating factors for remaining in the industry. It points to the importance of examining language in recruitment materials, job descriptions, and organizational mission to make sure a range of aspects are included to appeal to a broad spectrum of workers. Organizations must also pay attention to addressing fear, ignorance, misperceptions, misconceptions, toxic cultures, and a lack of recognition that the career drivers and values are different for women, younger generations, and other underrepresented individuals. Strategies centered on traditional motivators that are attractive to less diverse cohorts are likely to be ineffective for broadening organizational diversity.

6.2 Recommendations for Employers

These findings lead to the following recommendations for increasing inclusive culture and achieving greater gender balance within the transportation industry:

1. Organizations must have a sincere commitment to establishing a culture of inclusivity. This means clearly communicating a business case for DEI and its importance to organizational values and ensuring leaders "walk the talk."

2. Purposefully establishing an environment and expectations for behaviors and interactions within the workplace is necessary to limiting microaggressions and other destructive practices to achieving gender parity. A culture of respect and value for all individuals in the workplace is essential.

3. Progress must be tracked and leadership at all levels held accountable for gender parity and cultural transformation to be achieved.

4. Organizations must take intentional steps to ensure intersectionality is top of mind in developing successful strategies and interventions for increasing gender balance. Companies that are strategic and proactive in such efforts will capitalize on the opportunity to engage larger segments of the population.

5. Recognizing the diversity in motivators and values for individuals is key to creating successful approaches to recruitment, retention, and advancement that result in greater representation of women and other underrepresented groups in the transportation industry. This must be reflected in how opportunities are promoted, incentives are designed, and individual value to the organization is communicated.

6.3 Additional Research Needs

There are many opportunities for an increased understanding of the challenges and the impacts of the measures and efforts put in place to improve workforce participation. Providing an accurate way of analyzing easily obtainable data to consider all transportation employees would increase

understanding of the challenges the industry faces. Additional research that focuses on the beneficial outcomes of improved diversity from a longitudinal perspective would shed light on the impacts of particular diversity, increasing strategies over time.

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Appendix A

Researchers affiliated with the Mineta Transportation Institute at San José State University, are conducting research to better understand gender diversity and inclusion in the transportation workforce. The goal of the research is to develop recommendations that will serve as a tool to support industry leaders, policy makers, politicians, and the academic community in addressing current workforce shortage challenges.

The research team is interested in learning about your experience and opinions as someone working in the transportation industry in the United States and Canada. ALL transportation industry workers are invited to participate. This survey will take approximately 10 minutes to complete and is anonymous. For more information or questions about this study, contact the lead investigator, Jodi Godfrey, at jodis@usf.edu.

1. Do you agree to participate in this survey?
2. Are you 18 years or older?
3. Are you currently employed in the transportation industry in the United States or Canada? By transportation industry, we mean any business, agency, or organization that primarily deals with or builds infrastructure to support the movement of people or goods.
4. What is the mode of transportation in which you are currently employed? (select all that apply)
    a. Transit (Bus, transit rail, passenger rail, ferry)
    b. Highway
    c. Aviation
    d. Maritime
    e. Micromobility
    f. New Technologies
    g. Freight Rail
    h. Multimodal
    i. Active Transportation
    j. Other_____
5. What is your current occupation in the transportation industry?
    a. Administrative
    b. Audit and compliance
    c. Communications/public relations/public engagement
    d. Construction
    e. Driver/operator/logistics
    f. Engineering
    g. Equity/diversity/civil rights
    h. Executive/senior management
    i. Financial
    j. Government affairs/policy
    k. Human resources/training and development
    l. IT/information technology

m. Law/legal
n. Maintenance
o. Operations
p. Planning
q. Research/innovation
r. Other, please specify _____
6. Are you employed by:
   a. Public sector
   b. Private sector
   c. Small and disadvantaged business enterprises
   d. Non-profit
   e. Academia
   f. Other _____
7. How many years have you been working in the transportation industry?
   a. Less than 5 years
   b. Between 5 and 10 years
   c. Between 10 and 20 years
   d. More than 20 years

Attitude section (items 7-10 are 3-point Likert scale).

8. Please indicate how strongly you agree with the following statements (support for professional growth):
   a. I am growing professionally.
   b. I have the opportunity to do challenging things at work.
   c. I have a firm idea of how I want my career to advance and specific career goals.
   d. I have someone **in** my organization that is invested in my career growth and success.
   e. I have someone **outside** of my organization that is invested in my career growth and success.
   f. I see a path for me to advance my career in my company/organization.
   g. I have the same opportunity to grow and advance as others in my company/organization.
   h. I have the opportunity to showcase my talents in my company/organization.
9. Please indicate how strongly you agree with the following statements (corporate culture):
   a. The leadership of my company/organization encourages diversity.
   b. My organization clearly communicates the value of a diverse and inclusive workforce.
   c. This company respects individuals and values their differences.
   d. At this company, employees appreciate others whose backgrounds, beliefs, and experiences are different from their own.
   e. Racial, ethnic, sexual, and gender-based jokes or slurs are not tolerated at this organization.
   f. The leadership invests financial resources in DEI efforts.
   g. I have personally experienced or witnessed discrimination in my company/organization. Discrimination here refers to unfair treatment because of

race, color, religion, sex (including pregnancy, gender identity, and sexual orientation), national origin, disability, age, or genetic information.

    h. I have personally experienced or witnessed harassment in my company/organization. Harassment here refers to unwelcome conduct that is based on race, color, religion, sex (including pregnancy, gender identity, and sexual orientation), national origin, disability, age, or genetic information.

10. Please indicate how strongly you agree with the following statements (sense of belonging – company):

    a. I have strong ties with my peers in my company/organization.

    b. I am proud to work for my company/organization.

    c. I often talk with friends and family about my company/organization and our mission.

    d. I share skills, background, and interests with my peers in this company/organization.

    e. I am just as capable as my peers in my company/organization.

    f. I can see myself working at this company/organization long-term.

    g. I have the same growth opportunities as my peers in my organization.

11. Please indicate how strongly you agree with the following statements (sense of belonging – profession):

    a. I have strong ties with members of the transportation industry.

    b. I am proud that I am a member of the transportation industry.

    c. I often talk with friends and family about the transportation industry and our mission.

    d. I share skills, background, and interests with my peers in the transportation industry.

    e. I am just as capable as my peers in the transportation industry.

    f. I can see myself working in the transportation industry long-term.

    g. I have a similar growth potential as my peers in the transportation industry.

12. When I think about the transportation industry, the first word that comes to mind is: _____. (word cloud)

13. Please drag the slider bar to indicate your overall satisfaction with being a member of the transportation industry (smiley slider).

14. Does your workplace have a policy, plan, metrics, or other resources that defines what is necessary to be promoted within that organization? (yes/no/not sure)

15. What workplace policies/programs does your current organization offer? Select all that apply.

    a. Flex time (work a full day but working hours can vary)

    b. Compressed work week (work for longer periods of time per day or shift in exchange for a day off)

    c. Telework/work remotely/telecommuting

    d. Job sharing (when two or more employees share one or more positions or set of duties)

    e. Gradual retirement (phased approach to retirement, reduce working hours over time)

    f. Hybrid (a combination of telework and in-person office work)

    g. DEI Officer

     h.   Employee Resource Groups
     i.   EDI plan or policy
     j.   Formal Mentoring Program
     k.   Other, please specify

        _____
     l.   I don't know

16. What workplace policies/programs are most important to you? (Select top three).
     a.   Flex time (work a full day but working hours can vary)
     b.   Compressed work week (work for longer periods of time per day or shift in exchange for a day off)
     c.   Telework/work remotely/telecommuting
     d.   Job sharing (when two or more employees share one or more positions or set of duties)
     e.   Gradual retirement (phased approach to retirement, reduce working hours over time)
     f.   Hybrid (a combination of telework and in-person office work)
     g.   DEI Officer
     h.   Employee Resource Groups
     i.   EDI plan or policy
     j.   Formal Mentoring Program
     k.   Other, please specify

        _____
     l.   I don't know

17. What caregiving support programs does your organization have? Select all that apply
     a.   Maternity leave
     b.   Paternity leave
     c.   On-site daycare
     d.   Childcare assistance
     e.   Eldercare assistance
     f.   Other, please specify_____
     g.   My organization doesn't offer any caregiving support programs
     h.   I don't know

18. Do you describe yourself as a:
     a.   Female
     b.   Male
     c.   Genderqueer or genderfluid
     d.   Nonbinary
     e.   Transgender man
     f.   Transgender woman
     g.   Two-spirit
     h.   Some other way _____
     i.   Prefer not to respond

19. How old are you?
20. Are you of Hispanic, Latinx, or Spanish origin?
21. Which of the following describe your race? Select all that apply.
     a.   American Indian or Alaska Native

      b.   Asian or Asian-American
      c.   Black of African-American
      d.   Native Hawaiian or Other Pacific Islander
      e.   White
      f.   Other, please specify

      _____

22. What is your highest level of education?
      a.   Less than high school
      b.   High school graduate or GED equivalent
      c.   Trade School
      d.   Apprenticeships
      e.   Some College (no degree obtained)
      f.   Associate's Degree
      g.   Bachelor's Degree
      h.   Master's Degree or higher
23. Were you the first generation in your immediate family to attend college? (dependent upon response to question 21)
24. How many people reside in your household (including yourself)?
25. How many children (under 18 years old) reside in your household?

Appendix B

1. Demographic information:
   a. Title/role
   b. Company/org
   c. # years in industry
   d. Gender, race/ethnicity, education/training
2. What attracted you to the transportation industry?
3. How did you learn about and obtain your first transportation industry job?
4. Please briefly describe what your experience has been in moving up the ranks in your career.
5. What is the primary reason that you have remained in the transportation industry?
6. Have you ever considered leaving the transportation industry? If so, why did you choose to stay?
7. What do you think are the primary barriers to achieving more balanced gender representation in the transportation industry?
8. What strategies or initiatives to attract and retain more balanced gender representation do you think are most likely to be successful? If you have seen highly impactful practices or programs, please describe them.
9. Is there anything else that you would like to share that I have not asked you about today?

About the Authors

Jodi Godfrey, MSCE

Jodi Godfrey has been a Senior Research Associate at the Center for Urban Transportation Research (CUTR) at the University of South Florida (USF) since 2012, where she works on the Transit Safety and Workforce Development Program. Ms. Godfrey received her bachelor's and master's degrees in civil engineering from USF. Jodi is the faculty advisor of the USF ITE Student Chapter, the co-chair of the International Women in ITE Committee, the secretary of the Transportation Research Board's Standing Committee on Transit Safety and Security (AP080), and a member of the TRB Women and Gender in Transportation Committee (AME20). Ms. Godfrey also serves as the vice chair of the American Public Transportation Association Bus Safety Committee. She is passionate about safety, improving diversity in the transportation industry, and fighting to end human trafficking.

Stephanie Ivey, PhD

Dr. Stephanie Ivey is a Professor of Civil Engineering at the University of Memphis (U of M). She directs the U of M's Southeast Transportation Workforce Center and is Associate Director of the Division of Transportation and Logistics in the Center for Applied Earth Sciences and Engineering Research. She has a strong record of STEM workforce and education research, with special emphasis on transportation workforce development, partnerships between industry and academia, and increasing representation of women and other underrepresented groups in transportation.

Dr. Ivey is co-chair of the Institute of Transportation Engineers STEM Committee and serves on the Federal Reserve Bank of St. Louis Transportation Industry Council and the Board of Directors for the Greater Memphis IT Council.

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