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MTI MINETA TRANSPORTATION INSTITUTE

Attracting and Retaining Women in the Transportation Industry

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MINETA TRANSPORTATION INSTITUTE

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ATTRACTING AND RETAINING WOMEN IN THE TRANSPORTATION INDUSTRY

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16. Abstract

This study synthesized previously conducted research and identified additional research needed to attract, promote, and retain women in the transportation industry. This study will detail major findings and subsequent recommendations, based on the annotated bibliography, of the current atmosphere and the most successful ways to attract and retain young women in the transportation industry in the future. Oftentimes, it is perception that drives women away from the transportation industry, as communal goals are not emphasized in transportation. Men are attracted to agentic goals, whereas women tend to be more attracted to communal goals (Diekman et al., 2011). While this misalignment of goals has been found to be one reason that women tend to avoid the transportation industry, there are ways to highlight the goal congruity processes that contribute to transportation engineering, planning, operations, maintenance, and decisions—thus attracting the most talented individuals, regardless of gender. Other literature has pointed to the lack of female role models and mentors as one reason that it is difficult to attract women to transportation (Dennehy & Dasgupta, 2017). It is encouraging to know that attention is being placed on the attraction and retention of women in all fields, as it will increase the probability that the best individual is attracted to the career that best fits their abilities, regardless of gender.

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EXECUTIVE SUMMARY

Globally, women account for 50% of the working age population, but only generate 37% of global gross domestic product (GDP).[1] While women are making up more of the workforce than they were a few decades ago, some industries continue to struggle with attracting and retaining women. The attraction and retention of women in the transportation industry is an international challenge, even with the increases in women in the labor force and increases in educational attainment by women. The transportation industry includes any occupation, and is not solely limited to, transportation engineering, planning, operations, maintenance, and research.

The objective of this study is to summarize previously conducted research and identify additional research needed to attract, promote, and retain women in the transportation industry. This study will detail major findings and subsequent recommendations, based on the annotated bibliography, of the current atmosphere and the most successful ways to attract and retain young women in the transportation industry in the future. Many times, it is perception that drives women away from the transportation industry, as communal goals are not emphasized in transportation. Men tend to be attracted to agentic goals, whereas women tend to be more attracted to communal goals.[2,3,4] While this misalignment of goal congruity has been found to be one reason that women tend to avoid or leave the transportation industry, there are ways to highlight the goal congruity processes that contribute to transportation engineering decisions, thus attracting the most talented individuals, regardless of gender. Other literature has pointed to the lack of female role models and mentors as one reason that it is difficult to attract women to the transportation industry.[5]

Many studies have found that attracting women to the transportation industry requires a multifaceted holistic approach. Diversifying the perception of the industry is necessary in order for women to consider careers in the transportation industry. Without showing that women belong in the industry, the attraction of qualified women will be difficult. To diversify the perception of the industry, it is imperative to connect with women early, and not just early in their careers. Connecting with school-aged girls at younger ages and piquing their interests in transportation early can increase the likelihood of attraction to the industry as they move into the career decision phase of their lifecycle. Aside from attracting women early, having a flexible and encouraging culture will help encourage women to join the transportation industry by removing the stigmas associated with it being a male-dominated industry. Attracting a diverse talent pool will require consideration of the motivating factors of the desired talent pool, focusing recruitment efforts on highlighting how organizations can fulfill those motivating factors. Those recruitment efforts should include examples of how both communal and agentic goals can be accomplished to ensure the ability to attract talent, no matter the personal goal congruity.

As the transportation industry improves at attracting women to the industry, additional efforts will need to focus on retention strategies to ensure that those talented women that join the industry remain in the industry. One key to retention is ensuring that organizations remain committed to the goals that were set initially to attract the diverse talent pool necessary to succeed in the transportation industry. Keeping set goals of creating diverse, flexible, welcoming work environments must be deliberate and intentional. It is important to

document and distribute the deliberate diversity efforts throughout the industry, to improve the current transportation industry culture. Mentorship is another important ingredient to the retention of great talent in the industry, with a particular emphasis on same-gender mentor/mentee matches. Successful mentorship is a key element to succession planning within an organization. Additionally, clear steps to advancement and organized succession planning will contribute to the ability to retain a diverse talent pool, as clear paths reduce the likelihood of being overlooked for a promotion, or other discriminatory actions.

I. INTRODUCTION

The proportion of women aged 16 and older in the U.S. workforce has grown steadily from 29.6% in 1950 to 47.5% in 2017, according to the Bureau of Labor Statistics,[6] and the U.S. Census Bureau (Table S2401). However, the growth in women's share of the labor force has not been homogeneous among occupations. Women account for the vast majority of preschool through middle school teachers, nurses, secretaries, and administrative assistants, and receptionists and information clerks, while men tend to account for large shares of drivers, laborers and freight, stock, and material movers, construction laborers, carpenters, and automotive service technicians and mechanics.[7] The U.S. Census Bureau American Community Survey began tracking occupation by sex in 2000, at which time women accounted for 12.1% of transportation occupations. As of 2017, women's share of transportation occupation increased to 14.6%. This includes Transportation supervisors and material moving workers, aircraft and traffic control operations, motor vehicle operations, rail, water and other transportation occupations.[8]

Despite the promotion of the Science, Technology, Engineering, and Math (STEM) industry as valuable and desirable,[9] many engineering firms are facing the impeding loss of retiring leadership without clear transition plans,[10] and the transportation industry as a whole faces a growing shortage of transportation engineers.[11] At the same time, the share of the population that is obtaining college degrees has been increasing. According to the American Community Survey data, the share of men that are 25-years-old or older with at least a bachelor's degree increased from 28.4% in 2005 to 31.0% in 2016, while women's educational attainment for the same age group over the same time increased from 26.0% to 38.9%, surpassing that of men.[12]

The combination of the increasing share of women in the workforce, increasing educational attainment, and shortages of transportation engineers with a lack of comprehensive succession planning, all point to the necessity of tailoring the descriptions and perceptions of STEM careers, especially those in the transportation field, to be more gender inclusive. Without a shift in the outreach efforts of the industry, the transportation industry will struggle to evolve and progress over time through the attraction of the most talented selection pool of candidates. Diverse perspectives are incredibly important, especially in science, as they promote innovation and creativity to solve unique challenges associated with the needs of a diverse populace.[13] As the importance of equity and inclusiveness increases, diverse solutions will require a diverse workforce.

This annotated bibliography will capture the work that has been done related to attracting, promoting, and retaining women in the transportation industry focusing on the resultant findings and recommendations in the literature. After the review of the current state of the practice in terms of female participation in the transportation industry, this annotated bibliography will describe the findings of research related to the attraction, promotion, and retention of females in the transportation industry.

Research has pointed to many factors that affect the attraction of females to non-traditional female industries like STEM, such as the diversity of the perception of the organization,[14] early connections with students,[15] incentives, flexible workplaces, a welcoming culture,[16]

and the connection to congruent communal goals.[17] The successful promotion of women in the transportation industry is related to opportunities for advancement and the availability of role models, especially female role models, to encourage and guide women, especially in pivotal points in their careers.[18] Finally, the retention of women in the transportation industry is correlated with the actual culture that was mentioned in the retention of women, clear steps to advancement that were necessary for the promotion of women, and to the availability of ongoing mentorship and succession planning. Much of the previous research that has been completed resulted in recommendations to agencies and to the industry, which will be detailed in the conclusion of this annotated bibliography.

II. FINDINGS

In order to fulfil the objectives of this study—that is, to identify current challenges associated with attracting women to the transportation industry—one must first understand the current state of the practice. This will allow us to explain why women account for less than 15% of the total transportation occupation workforce in 2017.

STATE OF THE PRACTICE

The Federal Highway Administration (FHWA)'s *Public Roads Magazine* 2010 article on "Women in Transportation" revealed that while the proportion of women in the workforce has consistently increased since the 1950s, women remain underrepresented in engineering and the transportation industry. The article cited that just 10.4% of all civil engineers were women in 2008, and in other transportation and material moving occupations the percentage of full-time employed female workers was only 13%, even though women made up 46.5% of the total labor force. The article cited a lack of equity between sexes at the individual level, possibly related to gaps in education or a lack of role models. At the industry level, this contributes to unnecessary limitations on the talent pool, and deprives the transportation field of a vital source of talent. To combat this issue, leaders in the profession were interviewed, resulting in five recommendations. First, connect with children and young people through school programs and social media to promote science and engineering. Second, build relationships through networking. Third, participate in industry organizations and take leadership positions. Fourth, institutions would benefit from mentoring young professionals. Finally, recognize that workers have lives outside their jobs by ensuring flexibility in scheduling, facilitating telework, and avoiding the necessity for long work hours.[19]

As mentioned earlier, the difficulty in attracting women to the transportation industry is not just a national phenomenon. The international transport sector is having similar difficulties, with women accounting for only 17.5% of the workforce in the European Union's urban public transport, and women hold less than 10% of the technical and operational jobs in the EU. Yet, it is extremely important that women are provided with ample opportunity to succeed in transportation careers, to allow them to present their unique perspectives to the issues that are being faced by the modern global transportation system, according to Susan Kurland, former U.S. Assistant Secretary of Aviation and International Affairs.[20] The European Union funded a project that began in October of 2016 entitled "Skillful: Skills and competences development of future transportation professionals at all levels," which focused on the necessary skillsets that should be emphasized to ensure candidates entering the transportation sector obtain the necessary training to fulfill the interdisciplinary elements required in the transportation industry.[21] The goals of the Skillful Project were threefold: (i) to review the skillset and competencies necessary to be paradigm shifters in the transportation sector; (ii) to structure the curricula and training necessary to develop the identified necessary skillset; and (iii) to identify new business roles in education and training to develop EU-wide competence in a sustainable way. Focusing education and training on the necessary skillsets required to be successful in the transportation industry will ensure the best-qualified candidates are prepared to enter the transportation sector.[22]

The Institute of Transportation Engineers participated in the National Science Foundation funded STEM Inclusion Study related to minority populations in the STEM field. This STEM Inclusion Study developed,[23] conducted, and analyzed the results of a survey, which was distributed exclusively to the Institute's membership, so all respondents are transportation professionals or transportation students. This study is part of a workplace climate study and voluntary participation resulted in a tailored organizational climate report.[24] The study details some of the previous research that has corroborated the obvious lack of diversity that is abundant in STEM fields. Diversity is an important aspect of collaborative work, as it provides a wide array of perspectives, allowing for a holistic view of approaches to problem solving. The STEM Inclusion Study classified respondents by sex, race, LGBTQ status, and disability status in an attempt to gain a better understanding on their perceptions and experiences in the workplace. The survey garnered 2,647 responses (21.5% response rate). However, student responses were filtered out of the analysis resulting in a sample size of 1,888. Statistical significance levels were determined using logistic, ordinary least squares, or ordered logit regression models depending on the dependent variable in question. Women respondents indicated that they feel like they fit in nearly as much as male respondents reported the feeling of belonging. Respondents were asked if they have read or heard insensitive/offensive comments in the workplace. While the average was at least once in the past year, women were statistically significantly ($p<.001$, two-tailed test) more likely to have heard at least one insensitive comment. Women were also more likely to report hearing a negative comment or joke ($p<.01$, two-tailed test). When asked about personally being harassed either verbally or in writing, the averages were much closer to never. However, women and people with disabilities were more likely to have been harassed at work. Women worry statistically sigficantly more ($p<.01$, two-tailed test) that their mistakes are more noticable than the mistakes of others. Similarly, women are statistically more likely ($p<.001$, two-tailed test) to feel that they have to work harder than their colleagues do in order to be perceived as legitimate. However, the average woman's response falls between "somewhat disagree" and "neutral" when they were asked if they feel like they have to work harder than their male counterparts.

Responses were also categorized by type of employment, differentiating between for-profit, university, other employed, and students. When asked if women must work harder to convince colleagues of competence, the only statistically significant ($p<.01$) difference from the mean was in the for-profit category, in which 13% agreed with the statement, compared to the overall average of nearly 18% of respondents agreeing with the statement that "women must work harder to convince colleagues of competence". Finally, it was found that nearly 20% of all respondents have witnessed people being treated differently due to gender in the last three years.

Lean In is an initiative that promotes confidence building in small peer groups that meet regularly around the world. With a recognized need to change the trajectory of women's participation in leadership roles, campaigns are launched to promote encouragement, and the benefits of diversity. McKinsey & Company is a global management consulting firm that has studied the importance of women in the workforce for over a decade. A 2017 study on Women in the Workplace evaluated 222 companies human resources (HR) practices and surveys to gain a holistic understanding of the state of the current practice.[25] This is a continuation of a series of this study, which was initiated in 2012. The study found that

although 57% of recent college graduates are female, they are underrepresented at every level of employment from entry level to C-suite roles. This study also revealed that women are less likely to regularly interact with or receive advice from managers and senior leaders on career advancement, yet employees who do are more likely to be promoted. This study also revealed the inconsistency in perceptions between men and women in terms of how they see their organization. Men are more likely to see their organization as equitable, while women are more likely to recognize room for improvement. In order to promote gender equality in the workforce, this study recommends making a compelling case for diversity, investing in employee training, giving managers the means to drive change, ensuring the hiring, review, and promotion process is clear and fair, providing flexibility, and focusing on accountability and results is the best way to promote gender equality. Robert Groves, the former Director of the U.S. Census Bureau, appeared in an interview in 2011 discussing the trends of women in the workforce.[26] The information presented revealed that the share of women aged 25-years-old or older with a bachelor's degree or higher equaled the share of men in the same age category with the same educational attainment in 2010 for the first time in U.S. history.

Gender equality and, more specifically, gender diversity in the workforce are key to the economic growth required for companies to win the talent war. While the current workforce is combating challenges associated with an aging population and delayed or imbalanced succession planning, it is more important than ever to ensure that the talent pool encompasses all qualified candidates, and women are the largest pools of untapped labor globally. The report *Women Matter – Time to Accelerate* outlines key points of how growth and performance are at stake if succession plans lack diversity, and the progress of women entering, especially the management and c-suite levels, has been slow. The report continues that the shortage is not due to a lack of ambition or lack of educational attainment, but rather due to persistent barriers in society and corporations, which is more pronounced at the global scale. It is important that companies enable women's participation by creating gender-neutral organizations, and building a pipeline for women to advance their positions, and by engaging men to ensure they are making deliberate decisions. McKinsey continues to indicate that corporate change requires three main keys, persistence, CEO and management commitment, and holistic transformation programs, all of which are very applicable to any type of organization.[27]

ATTRACTING WOMEN TO THE TRANSPORTATION INDUSTRY

Many occupations such as lawyers, physicians, and mail carriers, which have traditionally been male-dominated, have improved at attracting women, transforming their perception from nontraditional for women. The Women's Bureau defines a nontraditional occupation as one where less than 25% of the workforce is women.[28] Although the share of women in the engineering profession has increased substantially over the past quarter of a century, engineering and other transportation-related occupations remain male-dominated. *Transportation Workforce Issues and Opportunities* frames the challenges with the industry attracting and retaining a diverse qualified workforce, citing unattractive industry perceptions, and inadequate career development opportunities.[29]

Some of the most influential women in engineering have suggested that if the postal service can successfully attract women, there is no reason transportation cannot attract women as well.[30] When asked for advice for attracting women to their organizations, those eight women indicated that connecting with young people, networking, and participating in professional organizations are the three most important things for women.

Some tips to connect with young people from the Hanson and Murakami 2010 report include sponsoring field trips, educating school counselors about opportunities for women in engineering, and sponsoring summer internships and semester-long apprenticeships for high school and college students. Establishing connections with local universities to encourage students to get hands-on experience while working towards their degree will form mutually beneficial exposure to the transportation workforce. Another suggestion included connecting with the younger generation via social media platforms such as YouTube, Facebook, LinkedIn, Twitter, and Instagram. Finally, recommendations included connecting with young people by working closely with existing programs that encourage students, especially women, to consider engineering, such as the FHWA Summer Transportation Internship Program for Diverse Groups,[31] the National Summer Transportation Institute Program,[32] the Garrett A. Morgan Transportation Technology Education Program, and the National Academy of Science's *Engineer Girl* program.[33]

Networking and participating in professional organizations are greatly related, as participating in professional organizations includes activities such as attending meetings and socializing with peer professionals, which is one form of networking.[34] Not only being a member of a professional organization, but also volunteering to run for a board or officer position, increases the effectiveness of networking efforts while also increasing the visibility of women as leaders. Simple visibility is inviting to young women who may be deterred or intimidated by the lack of diversity typically presented in the transportation sector.[35]

The Asia-Pacific Economic Cooperation (APEC) Transportation Ministerial directed a Working Group to launch the *Women in Transportation* initiative in 2011 to develop and implement actions to advance opportunities for women. The initiative resulted in an APEC Women in Transportation Forum Discussion Group Summary Report, released in December 2012, that highlights education, access to jobs, retention, and leadership as the four pillars necessary to advance the role of women in transportation.[36] The discussion includes best practices, challenges, and helpful tools to consider. Best practices in education include outreach programs, mostly focusing on the high school through university-aged population, including the American Public Transportation Association (APTA) Youth Summit, the WTS International workforce development resources,[37] and other FHWA and U.S. Department of Transportation (DOT) outreach programs. An updated APEC report titled, APEC Women in Transportation Data Framework and Best Practices Initiative: Update of the WIT compendium of best practices was released in 2017.[38] The APEC report also indicates the importance of early engagement and exposure to positive role models. The challenges associated with attracting women to transportation early that were identified through this initiative include the perception of a lack of excitement in the industry, the lack of diversity, and the lack of advancement absent educational attainment and licensure. Promoting the range of communal goal options in the transportation industry with the exciting range of specialization alternatives, in addition to providing scholarships to promote women in the transportation industry can help to overcome some of these challenges.[39]

Focusing on the second pillar—access to jobs—the EU requires quotas and benchmarks for women representation on boards, which the APEC Report identified as a successful approach to increasing women's access to transportation jobs. Additionally, many educational outreach programs were noted by APEC as successful. With challenges associated with the lower number of women applicants, it is vital to market the industry as one with diverse options. Successful marketing requires increased visibility through woman-focused targeted recruiting, and the promotion of women-dominated websites and programming.[40] The WTS *Transportation You* program for girls aged 13 to 18 has been cited as highly effective at encouraging girls to pursue careers in the transportation industry, providing guidance on professional development and other career planning.[41] There are challenges associated with the attraction of women to the transportation industry, such as unappealing perceptions. The perception of the work–life imbalance associated with careers in the transportation industry contribute to the difficulty of attracting women to the industry.[42] The lack of flexibility in scheduling was cited as a specific explanatory factor for a lack of retention of women in the transportation industry.[43]

The third pillar that was evaluated in the APEC Forum was retention. Having welcoming facilities—such as access to gyms, day care, and medical facilities—are found in many successful organizations, such as Delta Airlines.[44] The government is also successful at attracting women, which is likely to be at least partly attributable to the work–life balance that is associated with public employment, as opposed to private organization employment.[45] The value of developing a sense of community and support within the organization plays a significant role in retention.[46] Additionally, focusing efforts and attention on the diversification of the workforce is beneficial to the current workforce and prospective newcomers by displaying the organization's commitment to improvement.[47] Mentoring, sponsorship, and promoting involvement in professional organizations to foster networking are all instrumental to the retention of women in the transportation industry.[48] Additionally, clearly defined opportunities for advancement and professional development, along with flexible work schedules attract women for long-term careers.[49]

Leadership is the last pillar mentioned in the APEC Forum on Women in Transportation, which touts networking opportunities, such as affinity groups, where the ideas that are generated are incorporated throughout the organization, creating a sense of pride, ownership, and empowerment. Other leadership programs, mentors and sponsors, and flexible work environments with re-entry strategies are keys to creating an industry that will attract the best leaders.[50]

The Women in Transport International Transport Forum from June 2015 quoted Jessica Jung,[51] the Director of Corporate Social Responsibility of Bombardier Transportation, indicating that, in order to increase the number of women in a male-dominated transportation industry, it is crucial to set specific targets, develop road maps to reach these targets, and implement regular monitoring. Additionally, it is important to have a gender-balanced final interview panel to avoid cognitive bias.

The culture of an organization can also play a significant role in their ability to attract women to the industry. A diverse workforce, and inclusive culture, improves perceptions of an organization, leading to increased diversity of work environments.[52] Additionally, policies

that restrict the amount of earned time-off that can be taken at once can play a significant role in attracting, and then ultimately retaining women in the industry.[53] Analysis suggests that the challenges associated with attracting women to science-related careers such as transportation careers is not a simple situation.[54] There are many complexities, such as relative talents, general confidence, and social factors, that all combine to produce this challenge, driving home the fact that attracting women to the transportation industry will require more than ensuring access to education, as complex problems must be combated with holistic solutions.[55]

One key aspect to help attract women to the transportation industry is the ability to highlight the congruent communal goals that can be accomplished through transportation work. Studies have shown that women generally prefer to pursue communal goals in their career decisions, while men stereotypically are attracted to pursuing agentic goals.[56,57,58] Agentic goals are goals of independence and status, while communal goals are typically focused on working with and helping others in the community. While anyone in the transportation industry understands the undeniable connection with communal goals, it is necessary to alter the perception of the industry to match the reality. Importantly, there has been experimental evidence that shows the correlation between women's interest in STEM fields, and that fields ability to fulfill communal goals.[59] In one experiment, women who learn that a scientist spends the day working with others (as opposed to working alone) exhibited particularly strong increases in their attitudes toward science careers.[60]

Additionally, it has been shown that increasing the awareness of the communal congruity with STEM careers increases general student interest in such careers. Students often do not see the links to communal goals evident in STEM work (e.g., sustainability, food availability, and medical innovations).[61] Therefore, complementing lessons about STEM concepts and skills with specific ways that these knowledge sets can improve the quality of lives or save lives can have great benefits for students.[62] After lessons that show STEM's communal possibilities, classroom activities that encourage students to make connections between STEM course material and their lives can further increase motivation and learning.[63]

PROMOTE AND RETAIN WOMEN IN THE TRANSPORTATION INDUSTRY

To effectively increase the diversity of the workforce of the transportation industry, it is important to consider not only the key aspects that are required to attract women to the industry, but also the key aspects that are necessary to promote and retain women once they are in the field. While attracting women to the industry presents unique challenges, overcoming those challenges will be misguided if the same effort and resources are not focused on the retention of women. The Pan-Organizational Summit on the U.S. Science and Engineering Workforce meeting summary reported that turnover problems were related to the absence of adequate mentorship, ambiguity of the promotion process, and other minority neglecting decision making.[64] To retain talent in an industry, no matter the gender of the individual, clear paths to promotion are necessary as a fundamental cornerstone to ensure talent is retained.[65] It is important that the goals that were set in the organization to attract women to the industry, are adhered to if retention of women is expected. Goals set to attract the most talented workforce cannot just be stated or detailed in a policy that is

not effectively implemented in the organization. Assurance of adherence to the plan, and accountability if the plan and goals are not adhered to are an imperative component to successfully attracting and retaining women in the transportation industry.[66]

One specific talent retention aspect that is imperative to continue to emphasize is access to role models and mentors, both over a lifespan and during the immediate time when a person is making a career choice. Research has alluded that this is especially important for women and cultural minorities who chose nontraditional careers, such as women in the transportation industry.[67] Female role models are also particularly important to retaining women once they enter STEM; seeing the successes of other women in STEM can help prevent the threatening effects of stereotypes that shed doubt on women's competencies in these fields.[68]

Empirical research data suggests that any mentor, no matter the gender, can effectively attract women to the engineering field, while female role models are more effective in the retention of women in the field.[69] Other research reinforces the notion that women who have female mentors and role models are more likely to remain in the engineering industry. For example, a multiyear longitudinal study that followed 150 incoming female students majoring in engineering at a public university, which is unique for this topic, showed that women who received mentoring and guidance from other successful women in the industry were more likely to remain in engineering-related positions upon graduation and throughout their careers. Women that received no mentoring (the control group), and women paired with male mentors both showed steep declines in feelings of belonging in engineering from the beginning to the end of the first year. Alternatively, women with female mentors reported more stable feeling of belonging. The visible success of women mentors and women peers contributes to the likelihood of retention, due to the confirmation of possible success in a male-dominated industry. Additionally, female mentors also affected the degree to which anxiety of female engineering students was offset by confidence that they possessed the skills necessary to overcome academic difficulties. The study concluded that retention of female engineers will increase if they are mentored by another successful female engineer, especially in the first year, when self-doubt is greater. This increased retention is also related to the confirmation of the ability to satisfy communal goal congruity through analytical approaches of transportation engineering.[70] Similarly, results from three separate studies concluded that women's own self-concept benefited from contact with female experts, even though negative stereotypes remain in STEM fields.[71]

Understanding the motivations of the talent pool in the transportation industry will allow for strategically focused retention efforts. Historically, many women have pursued communal goals, as opposed to men who are more attracted to agentic goals in a general sense. This general preference by gender is evident through the most common occupations for women and men. The top occupations for women in 2015, according to the Bureau of Labor Statistics, are elementary and middles school teachers, registered nurses, and secretaries, all of which are aligned with communal goal orientation. Alternatively, the top occupations for men are sales workers, truck drivers, managers, supervisors, and laborers, which are more aligned with agentic goal congruity.[72] Communal goals focus on helping people and solving problems that cause challenges that hinder others, while agentic goals are more internally focus on prestige and status. That is not to say that all men focus on

agentic goals and all women are communally motivated, however it is important to know what motivates unique workforces.[73] When the personal motivations of the workforce are understood, it is then possible to focus the type of tasks that fulfill those motives, resulting in a more satisfied team of highly motivated individuals. It is important that management does not assume to understand motives without first actually asking individuals of their personal motives. It is also important to remember that not all people will necessarily know what actually motivates them. For those that are unsure of their driving motivators, a range of tasks that fill both communal and agentic goals to find what their true motives are. It is also important to understand that motives can shift over time, highlighting the importance of scheduled surveys or interviews of employees to gage their satisfaction with their duties performed. More importantly, if responses to those regularly scheduled surveys or interviews are not favorable, it is imperative that agencies make changes or adjustments to show that they care about, and are listening to, their employees.[74]

Another key factor in the attrition of women from the industry is parenthood. About 24% of mothers of preschoolers are opting out of the production, transportation, and material moving labor force (as of 2009).[75] This loss of new mothers in the transportation industry is worrisome given the challenges that the industry faces in attracting women in the first place. This opt out of the labor force is likely at least partly attributable to cultures that are not family friendly, and demand levels that are not favorable for working mothers.[76] Flexible schedules, generous maternity leave policies, opportunities for advancement, and help with childcare are all successful practices proven to retain women in the workforce after childbirth.[77]

The retention of women in science and engineering is not a new challenge, as the National Academy of Sciences' Committee on Women in Science Engineering published a report in 1994, based on a January 1993 conference titled "Women Scientists and Engineers Employed in the Industry: Why So Few?", outlining contributing factors to their departure from the industry.[78] Some key points from the report include the critical issue of career and personal life balance, which can be especially challenging for women with children who are highly motivated by achievement and recognition. Women at the conference shared their strategies to planning pregnancies around promotions to avoid being overlooked for advancement considerations. How a company addresses dependent care also factors into retention rates of women scientists and engineers. The Committee on Women in Science and Engineering continued with a review of some initiatives that have proven successful at attracting and retaining women, highlighting how diversity efforts have improved both male and female recruits. Effective policies should foster an inviting culture that understands women's issues, and require participation at all levels of the organization. A reoccurring theme throughout the conference was the importance of CEO commitment and deliberate gender diversity in hiring practices. Without well-rounded recruitment initiatives, organizations will not have exposure to the entire population of talent. Retention rates can also be improved through mentorship opportunities, as many women value the ability to influence the career choices of other girls and young women.

The National Academies of Sciences Engineering and Medicine, Transit Cooperative Research Program (TCRP) has funded a synthesis topic to investigate the topic of attracting and retaining women in the transit workforce, with a tentative scope that includes conceptualization of elevating the importance of women in the workforce, implementation

initiatives and strategies, costs benefit analyses, and other considerations. The work is scheduled to begin in October 2018.

Future research considerations may include a specific focus on successful balancing practices both for women and organizations, including actual examples of policies that can be implemented to encourage healthy work–life balance. Developing training related to cultural change would be beneficial guidance for all employment levels to ensure diversity inclusion is prevalent organization wide.

III. CONCLUSIONS AND RECOMMENDATIONS

The proportion of women aged 16 and older in the U.S. workforce has grown steadily from 29.6% in 1950 to 47.5% in 2017, and women's educational attainment has surpassed that of men according to the Bureau of Labor Statistics,[79] and the U.S. Census Bureau (Table S2401 and Table S1501). However, even with the increases in women's participation in the workforce, many STEM fields are struggling to attract women to the industry. Additionally, many engineering firms are facing the impending loss of retiring leadership without clear transition plans.[80] The transportation industry as a whole faces a growing shortage of transportation engineers,[81] highlighting the importance for the industry to focus on deliberate diversity inclusion in outreach and recruitment efforts.

The culture and the perception of the culture of an organization is the most important consideration when focusing on attracting a diverse talented workforce.[82] Culture is not a policy, a sign on the wall, or an acceptance letter signed when hired. Culture is the implementation of the policies that are in place, with deliberate focus on the consequences of each action and decision. Many times organizational leaders may not be aware of the true culture of the organization, unless anonymous surveys are conducted to determine the feelings of the workforce.[83] Additionally, the perception of an organization is important in recruitment, so organizations should intentionally support diversity efforts, and share those efforts through different outreach opportunities, such as annual association meetings, social media, magazine articles, etc.

Successful practices that have been found to attract women to the transportation industry include connecting with young people, networking, and encouraging professional organization participation, especially at leadership positions. Attraction is also dependent on education, access to jobs, retention strategies within the organization, and opportunities to advance to leadership positions.[84] Organizations have successfully attracted more women by first ensuring gender-balanced final interview panels are responsible for all new hiring, with recruitment materials that establish specific targets, provide guidance to reach those set targets, and inform how regular monitoring benefits the succession plan to leadership. Organizations must also have an inviting harassment-free culture, with implemented policies that allow for taking earned time off, and mentorship with opportunities to build confidence and skills. Additionally, it is important to highlight how many planners, engineers, and policy makers are fulfilling communal goals in their transportation careers.[85]

The promotion and retention of women in the transportation industry is multifaceted and requires holistic approaches and dedication from all levels of employment. One key aspect to retention of women includes the development and implementation of a clear succession plan, and the steps and accomplishments necessary to follow that succession plan to leadership positions within the organization. Another retention strategy includes promoting and providing access to role models and mentors for junior faculty, and access to mentoring opportunities for senior faculty. Mentoring at all levels is mutually beneficial as it helps to prevent threatening effects of stereotypes that shed doubt on the competencies of women in the transportation field. Knowing specific workforce and personal goals of employees will ensure that an organization can provide goal congruent opportunities, which will increase retention through job satisfaction.[86] Family friendly policies, the ability to take all the time

off that one has earned, and the opportunity to return to the workforce after childbirth are two factors that could reduce the loss of new mother workers, thus increasing retention rates of more diverse talent pool. Somewhat related, dependent care policies also affect retention rates of women scientists.[87] Further research that focuses on specific policies and implementation plans for organizations to use as framework to improve their organizational culture to promote deliberately diverse recruitment and retention efforts. Training development in this area would also be beneficial for the entire transportation industry.

Effective change in organizational culture is dependent upon the holistic development, implementation, and enforcement of diversity promoting policies. To summarize the attraction and retention recommendations that were discovered through this annotated bibliography the following 11 recommendations are highlighted.

Attracting women to the transportation industry can be improved with the following:

1. Connect with young people to promote the industry as a desirable career option. Mentor, and provide opportunities for others in the industry to mentor as well. The benefits of sharing success stories and providing advice, guidance, and prompt answers to mentees cannot be overstated.

2. Encourage participation in professional organizations, especially leadership participation and networking event attendance. Furthermore, encouraging participation in extracurricular activities will provide the opportunity to improve confidence and increase their visibility in the industry. That visibility and representation is mutually beneficial, and necessary for advancement opportunities.

3. Promote educational and career opportunities, focusing especially on minority recruitment efforts. Encourage the support of minority-focused scholarships, internships, and awards to increase the recruiting talent pool so that minorities are afforded opportunities that are not otherwise possible. This educational promotion may require changes in educational tools or traditional information delivery methods in order to ensure that there is a focus on the skills that are needed in the industry. Specifically soft skills, such as public speaking, could be incorporated into curricula without jeopardizing accreditation requirements.

4. Create a gender-balanced panel for all final decisions pertaining to hiring. Presenting a gender-balanced hiring panel is one way to show immediate dedication to diversity, while also ensuring that the hiring decisions are not biased.

5. Intentionally promote desired perceptions. Deliberately advertising an organization's support of diversity through as many outreach opportunities as possible, including professional organizations and associations meetings, social media, newsletters, and magazine articles, will promote the perception that is desired rather than allowing outsiders to define an organization's public perception.

6. Promote the communal goal congruity of transportation industry careers. Many engineers, planners, policy makers, researchers, and scientists are fulfilling personal communal goals throughout their careers.

   Promoting and retaining women in the transportation industry can be improved with the following:

7. Develop and adhere to a defined succession plan to ensure there is no bias in promotion decisions. With clear promotion guidance that is inclusive of specific requirements for advancement, there is no room for unintentional bias in the promotion process within an organization. Not seeing a path to advancement is a common reason provided by women who left the STEM industry.

8. Invest in best practices syntheses that collect and compare transportation organization's policies and implementation successes to develop and promote a toolbox of applicable guidance.

9. Conduct, or participate in recurring surveys to understand the effectiveness of the cultural diversity efforts in place. Sharing practices that were ineffective is just as important as sharing practices that were effective.

10. Ensure policies allow employees to take earned time off, without fear of retribution or loss of work availability upon return. Policies that are family friendly and allow for time off after childbirth and other dependent care considerate policies will all contribute to retention rates of qualified talent.

11. Finally, change must occur at every level of an organization to be effective. Buy-in must occur from the CEO to the front line to ensure effective cultural improvement.

While the opportunities and advancement opportunities for women have improved, there are still possible improvements. This annotated bibliography and subsequent recommendations should serve as a framework of considerations that individuals and organizations in the transportation industry may want to consider to solve the challenges of loss of talent due to retirement accompanied by a lack of active succession planning in the industry. In order to improve the talent pool, these recommendations may assist in the improvement of the environment and the perceptions of the industry as a whole, organizations, and women transportation professionals.

Further research that focuses on the specific development and implementation of a holistic diversity plan would be beneficial to the industry to serve as a framework with actionable specific improvements. Training will likely also have to be developed to ensure a consistent message of the transportation industry is shared and promoted.

This annotated bibliography used a broad-based approach to identify challenges in attracting and retaining women in the transportation industry. There is great value in examining this issue from many specific narrowed approaches in future research. For example, the work environments vary significantly from the private sector to the public

sector, or from a transit versus highway construction or design firm. With the variance in incentives and constraints that allow one to pursue communal goals in each of these transportation segments, there is great value in focusing future research on specific areas of the transportation industry. Additionally, focusing on the skillsets required to be successful in the transportation industry rather than taking an occupational approach would also be valuable future research for consideration. As the European Skillful Project mentioned earlier focusing education and training curricula on the skills necessary to succeed, would produce an industrywide benefit.[88]

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