

Beyond Mobility: A Global Perspective of Women's Participation in the Transport Industry

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Abstract

The transportation industry has long been labelled as one of the industries that has been viewed as dominated by men globally. Even though it has a historical foundation in the growth of the economy, labour mobility, Urbanisation, trade integration, and inclusion of the social population. Transport modes such as Road transport (road), Railways (Train), Aviation (Air), Maritime (sea), Logistics, Public Transit and Freight (for Goods and Services) are all examples of transport modes that have relatively fewer women in both operational and leadership positions compared to men. Although technological advancement, urban growth, changes in the labour market, and gender equality legislation have opened up new forms of participation for women, their representation is still limited by barriers such as structural inequalities, occupational segregation, restrictions on mobility, workplace culture, safety, and continuing stereotypes about women. Thus, this paper examines women's participation in the transport industry from a global perspective with a focus on the economic ramifications of gender parity in transport industry roles. The paper uses research articles, global studies reports, contemporary policy studies and academic evidence to look into how women have historically entered the transportation sector, how this sector conceptually changed for women, and global trends of female participation in the transport labour force. The paper argues that transportation should be considered not simply as a physical asset or infrastructure but rather as a tool that influences access to the labour market, social mobility and economic citizenship. The existing evidence also shows that women's participation in transport sectors produces productivity improvement for firms, increases service development, supports inclusive growth and contributes to the resilience of the labour market. However, there are still disparities in developing economies where significant barriers are present in informal labour markets, social reproduction burdens and inadequate gender inclusive mobility systems.

Keywords: Transportation, gender and employment, labour participation, global transport workforce, economic inclusion, gender-inclusive transport.

1. Introduction

Transportation is one of the most significant yet frequently overlooked sectors shaping social and economic growth. It not only moves people and goods but also determines access to jobs, education, healthcare, and public engagement. Beyond this, the transport network determines where people live, how economies operate, and who can engage in productive activities. Despite this contribution, the transport workforce is characterised by significant gender inequality. For a long time, the transport workforce has developed within institutional and occupational structures that predominantly catered to male labour

participation. Job functions that involve driving, logistics management, rail operation, maritime navigation, freight movement, infrastructure building, and technical provisioning have always been viewed as requiring physical strength, irregular hours, the ability to travel regularly, and reinforcing a notion of gender division of labour. As a result, women have been either formally excluded from these jobs or discouraged from applying due to assumptions about how they would be treated in the transport workforce (Turnbull, P, 2013a). The persistence of gender inequality within the transport workforce presents an interesting paradox. Although transportation enables women's economic participation in the labour force, the percentage of women employed as workers, decision-makers, operators, and leaders within this sector remains significantly low compared to men. Thus, this conflict and discrepancy have become a growing area of interest for scholars.

Several studies have focused on women's participation as users of public transport rather than as professionals working in the transport sector. A few studies have examined women's participation in the transport industry. According to Turner & Fouracre, 1995, women in developing countries are disproportionately affected by mobility limitations due to unequal access to employment opportunities and public services. More recent research has redirected the focus to women as active participants in transport labour markets and governance systems (Frasczyk, A. & Piip, J., 2019). Globally, women continue to be confined to administrative, customer service, and other lower-paid support roles, while technical, operational, or managerial roles continue to show significant occupational segregation (Acker, 1990). European statistics indicate that in the subsectors of the transport workforce, women represent less than 25% of employment and are even less represented in engineering and other operational positions (Pirra et al., 2020; Hortelano et al., 2021a). The issue is not solely one of gender representation in transport, but it also affects productivity, innovation, long-term economic performance, and labour shortages. Drawe & Zoghi (2021) contend that the inclusion of women in transport provides benefits to organisations, such as improved workforce resilience, better decision-making, and a stronger supply of talented workers. Similarly, logistics and supply chain-related research indicates that increasing gender diversity leads to better sustainable outcomes and improved organisational performance (Kuzey et al., 2022).

The recent innovation and improvement in the transport sector have led to the creation of more employment opportunities for women and advanced their economic empowerment. For example, evidence indicates that greater public transport accessibility correlates with a higher rate of female participation in the labour force, particularly in cities where the lack of commuting options often limits access to the labour market (Martinez et al., 2020). In India, it appears that investing in transportation infrastructure could potentially restructure women's employment and create new opportunities that can improve gender outcomes in the labour market (Lei et al., 2019a). For a better understanding of women's participation in the transport sector, the analysis should extend beyond labour statistics to corporate structural, institutional, and economic dimensions. Therefore, the objective of this article includes identifying the key elements that conceptualise the evolution of the transport sector and analysing the historical emergence of women's employment in the transport sector. It identifies global patterns of women's participation across transport subsectors and describes barriers, policies, and future opportunities for gender integration.

2. Transport Industry: Definition, Structure, and Economic Significance

The transport sector generally refers to the provision of organised services and facilities for moving people and goods through interconnected physical infrastructure systems and related services (Pokharel et al., 2023). The contemporary transport system includes much more than just the provision of mobility; it also includes all other components of an economic system that are interrelated to provide an efficient network for moving people and products to the market. The current Transport system represents an integrated set of economic systems that create connections between the labour market, production system, trading network, logistics system, and the delivery of public services and governance. According to International-level organisations and labour and transport frameworks. The transport sector encompasses all aspects of the mobility system, including the planning, construction, operation, maintenance, regulation, and management of transport across multiple modes. Such as rail transport Systems, Road Transport, maritime and water shipping, air transport, urban public transport, freight and logistics, warehousing and supply chain services, digital mobility, as well as governance and administration. The transport Industry serves as an economic multiplier through its ability to reduce transaction costs, enhance the level of integration of markets, positively impact labour mobility and promote industrial competitiveness. Therefore, a transport system that operates efficiently ultimately affects productivity and provides access to a range of economic opportunities across the country. In addition, transportation also has a social aspect, through its role in accessing education, employment, healthcare, and other services provided by government agencies.

Over the last five decades, there has been a major transformation of the transport sector. The traditional labour-intensive method of transport has been replaced by automation, digitisation, and the use of intelligent transport systems, big data analytics and integrated logistics networks (Kern, 2021). The result is that the workforce of the transport sector has changed in terms of skills and competencies, and new opportunities for the participation of women and others across demographic groups. Yet, from a gender perspective, transport is particularly noteworthy because of the uneven distribution of mobility. For example, men and women may use transport for commuting to their jobs. However, there may be a difference in how they commute and the time spent commuting, resulting from employment patterns, caregiving responsibilities, income, work schedules and other activities.

According to NG and Acker 2020, the transport sector is generally considered to be one of the least gender-balanced sectors globally, due to entrenched occupational cultures, systemic barriers and historical exclusion from technical occupations. Although there are many women in ticketing administration, customer interaction, and service roles, then working in infrastructure management, engineering, operational roles or any senior leadership position in transport. While Sagaris & Tiznado-Aitken (2023) stated that transport planning has traditionally been gender-neutral in nature, the outcomes are typically inequitable due to the predominant theme, creating both social and cultural structures of travel behaviour, which assume a male-dependent work pattern will prevail. Research conducted by Venter et al. (2007) shows that understanding transport within a gender analysis framework provides a broader understanding of transport use, both through the user and professional experiences. Their research suggests that women's experience is significantly shaped by the workplace itself, access to jobs, how women are educated, the level of support women receive from the organisation, and societal expectations. This factor exists across the spectrum of time and continues to affect how women can enter the transport occupation. Additionally,

Pirra et al. (2020) findings indicate that educational pathways into the transport and engineering industries still produce gender disparity because transportation has traditionally not been perceived as a feminine profession. This means that, in one set of careers, many women will experience limited career advancement as a result of being underrepresented in the transport occupation. Therefore, it is not appropriate to characterise transport as a gender-neutral sector, whether it is a part of a socially embedded system that includes economic inequalities associated with labour force participation for all individuals based on gender, class, mobility and access to opportunities

3. Historical Context and Emergence of Women as Transport Workers

The existence of women in transport is not a totally new phenomenon; however, their official designation as transport workers has been more recent to transpire. Before the rise of industrialisation, women indirectly participated in local trade, animal transport systems, domestic mobility networks and informal logistics activities. However, due to various forms of legal and social barriers, formal labour market employment in the transport industry was limited. In the late 19th and early 20th centuries, industrial growth increased the power of men working within railways, shipping and the public transport system. Technical Jobs were seen as masculine and associated with industrial citizenship. During the World Wars, the labour shortage created temporary opportunities for women workers in the transport industry; as a result, women entered the labour force to provide transport facilities to others (Uteng, 2011). In some countries, women were employed by railways, in maintenance jobs, administration, and as part of the urban mobility workforce. However, due to restructuring that occurred in the labour market after the end of the war, many women returned to their traditional domestic roles, and this was the turning point for women to work in the international workforce or a sign of change in the global labour market. With a high level of urbanisation, rapidly evolving technology, increasing public transit systems, and a growing number of platform-based mobility service offerings, employment for women has slowly begun to increase in the transport industry.

International results, such as the International Labour Organization (ILO, 2012) and the United Nations, have started to highlight gender inclusion as an important aspect of developing sustainable/inclusive development to increase access to employment in the transport industry. The transport sector is being reassessed, and now it's viewed not just as a technical or infrastructure-based industry but as a place where labour rights, gender equity, mobility and social equity intersect. However, significant gender-based disparity exists in advanced and developing economies, with women still being underrepresented in operational and managerial positions within the transport industry.

In the early 2000s, international organisations recognised women's participation in the workforce as an issue of both labour rights and economic growth. Studies show that women's participation in transport has increased over the past three decades through three significant transitions: the growth of service-based transport systems, which created administrative and customer-based opportunities; changes in educational access that enabled people to access both technical and professional credentials; and global policy initiatives emphasising gender equality, which facilitated institutional reform. Research by (Frasczyk, A. & Piip, J., 2019) documented the emergence of women-specific transport organisations and professional networks created to assist with the requirements, mentoring and retention. These organisations and networks are evidence of the acknowledgement that the transport labour shortage would not be solved through traditional recruitment methods that primarily targeted males. There is also evidence

from Europe that more innovative modes of transportation benefit from increased workforce diversity (Hortelano et al., 2021a). However, experiences from different countries demonstrate that there are several pathways to similar outcomes. The transit sector of Portugal has gradually increased its level of female inclusion over time, although there are still visible disparities with regard to career advancement and role concentration (Adorean et al., 2023). Women's participation in the logistics and transportation industries has continued to increase, although gender stereotypes still have an impact on women's career expectations (Leap Han, 2024). Within the maritime industry, women are still faced with systemic barriers, even though many sectors have undergone modernisation and have gone through international initiatives to promote gender inclusion (Narayanan et al., 2023).

Various studies from African countries also highlighted that women's participation in transport is impacted by combined responsibilities for both paid work and unpaid care responsibilities (Porter et al., 2023; Murphy et al., 2024). While infrastructure, urban transport, and logistics improvements have gradually increased the number of women employed in the transport sector historically, India has retained a largely male-dominated transport occupation, particularly in railway freight and public vehicle operations. However, the improvement of transportation infrastructure, urban transportation and logistics have created an upward trend in transportation operations. In India, these combined influences reflect the overall transitions of a developing nation. In India, transport jobs were historically male-dominated, except for a few occupations such as railways, freight and public vehicles. However, the improvement of transportation infrastructure, urban transportation and logistics has created an upward trend in transportation opportunities for women (Lei et al., 2019a). More recent evaluations of Indian urban centres show that existing gender norms shape women's access to transportation and that their labour force participation is influenced by the location of the workplace (Balachandran & Desai, 2024). However, in India, the intersection of transport policies, gender norms and labour force participation continues to shape job opportunities available to women (Balachandran & Desai, 2024). Thus, the involvement of women in the transport sector as workers not only indicates a diversification of the workforce but also signifies a change in the understanding of mobility as being essential for economic inclusion, as well as identifying transport labour as a site of gender transformation.

4. The Global Overview of Women's Participation in the Transport Sector

Numerous studies in the worldwide literature have discussed that, due to trade liberalisation, female participation in the labour force is impacted, and women are heavily underrepresented in the various non-traditional occupations. The transport industry is considered one of the sectors that reflects that women's representation is not only numerically lower than men's, but it is also unevenly distributed within occupations, sectors, levels of seniority, and modes of transport. According to the Gender Dimension of the Transport Workforce Report, across 46 countries, women made up only 17% to 22 % of transport workers, and their share fell from 20% to 18% between 2008 and 2018 (Ng & Acker, 2020a; Wright, 2019). These statistics imply that globally, women's involvement in public transport is often considered one in seven workers, especially with lower shares in technical and driving roles, and this representation varies greatly, differing based on subsector and regions (Wright, 2019). A recurring finding across transport studies also revealed that women are more visible in customer-facing and service-oriented roles than in operational and technical roles. Typically, women can be found working in administrative roles, ticketing, customer relations, communications, and support services, whereas men tend to dominate

driving, freight operations, engineering, infrastructure management, logistics operations, and executive decision-making, among others (Turnbull, P, 2013b). This trend shows that both occupational segregation and institutional segregation exist within the industry. Furthermore, aggregated statistics often conceal deeper inequalities as women continue to be concentrated in a select number of occupational categories and sectors.

5. Women's Participation across Transport Subsectors

Patterns of women's employment are fundamentally different across the transport sector, indicating that the transport sector cannot be viewed as an entire labour market.

Road Transport: Road transport is the biggest area of employment within the transport industry, but there is not much gender diversity when it comes to employment in this field. According to the International Road Transport Union (2024), women make up approximately less than 13% of the global workforce in road transport and only about 6% of professional drivers on the road. Their representation in public transport services is relatively higher, as is their involvement with the administration and management of urban mobility service delivery, whilst in contrast, under freight Transportation and commercial driver categories, women are much less likely to be included. There are still many barriers to women's participation in transportation, such as occupational stereotyping of drivers, lack of safe facilities for women at work, inadequate working conditions and irregular working hours (Turnbull, P, 2013b; García-Jiménez et al., 2020). Despite this, the emerging digital mobility platform and a more structured system for providing public transport services are creating some new pathways to employment.

Rail Transport: Compared to road transport, gender inclusion and opportunities have improved at a greater rate in the railway sector. Based on an estimate by the International Union of Railways (2024) estimates that women represent approximately 21% of the total workforce in the global railway industry. Most women work in customer service and administrative roles and station management, whereas areas such as engineering, locomotive operations and maintenance of infrastructure, and leadership are still male-dominated. The shortage of workers in this sector, the technical modernisation of the railway industry and government initiatives encouraging diversity in the workplace have improved recruitment of women. However, barriers to women advancing their careers and leadership positions still exist (Fraszczyk & Piip, 2019; Dontoh et al., 2025).

Maritime Transportation: It represents one of the most segregated segments of transportation in terms of gender, as reported by the International Maritime Organisation (2024). Women have 29% of the total workforce in the global maritime industry, but only have 2% of the total number of global seafarers. The reasons behind this disparity include long working hours at sea, workplace isolation, discrimination from their male colleagues and limited opportunities for advancement for women working in operational maritime careers (Narayanan et al., 2023).

Aviation and Air Mobility: Aviation shows a higher level of women's involvement than the other transport modes, but it still has a higher degree of occupational segregation. According to the International Civil Aviation Organisation (2022), Women comprise only approximately 43% of the overall aviation workforce, but only 5% to 6% of commercial pilots and 3% to 5% of aircraft maintenance engineers are women. Women continue to be employed in cabin crew, customer service, and administration, whereas there is still little representation of women in technical and leadership roles (Hortelano et al., 2021b).

Logistics and Supply Chain Systems: As a result of digitalisation, global trade and e-commerce, the logistics sector is one of the fastest-growing sectors globally. It is estimated that women represent 20% to 30% of the global logistics industry workforce. Women in logistics are present in higher numbers in procurement, planning, customer services and supply chain analytics than they are in freight transportation operations and warehouse management (Yang et al., 2024). Women are expected to gain more employment as technological transformation, automation and Industry 5.0 are utilised; However, the current factors of organisational culture, leadership bias and inequitable career advancement continue as barriers to women's success (Narkhede et al., 2025). Overall participation of women in each of the transportation food factors has improved, but has not been equal across the sub-sectors. Evidence indicates that there will be an increase in women's representation within the various industries, which is not only due to technological advancement, but also requires institutional reform, gender responsive public policy and gender inclusive workplace practices.

6. Grasping the Gender Gap in the Transport Sector: Institutional Constraints and Persistent Barriers

Based on the various evidence, it has always been classified as an economically enabling industry, but women's involvement as employees within the various segments remains disproportionately low across most of the subsectors and regions. Apparently, studies indicated that this difference cannot be accounted for by individual choices alone; instead, it originates from historical labour relations, organisational structures, unequal mobility, social expectations, workplace cultures and policy limitations, etc.

Historical construction of Transport as a male-dominated sector: Transport is still considered one of the most evident examples of horizontal and vertical occupational segregation. Horizontal segregation indicates that women are predominant in certain professional groups, while vertical segregation implies the idea that women are deprived of access to management and leadership roles. That assumption gave rise to transport being conceptualised socially as male work, and women were being categorised as related to household chores, and social services became even more apparent. Similarly, (Turnbull, P, 2013b) states that the transport sector often characterises informal rather than formal restrictions against women. While legal restrictions can disappear, recruitment processes, working cultures and professional norms will continue to promote men's involvement. Portugal indicates that the entry of women into transport employment has improved, but occupational inequality persists in relation to their male counterparts (Adorean et al., 2023). The historical form of occupation continues to influence current outcomes in employment.

Gender roles, Household responsibilities and labour market decisions- Multiple studies show that employment depends upon the social norms regarding gender roles. Women often tend to bear a higher burden of unpaid domestic work in a household, including childcare, elderly care and other social reproduction activities. These duties shape career preferences, commuting choices, working hours and employment continuity. Balachandran and Desai (2024) examined Indian cities and established that improvement in transport did not automatically lead to a high employment rate since participation in the labour market is grounded in social expectation. Likewise, Gupta & Roy (2023) argued that empowering women economically is not only about access to the labour market, but true empowerment requires transformation at the levels of decision-making in the household and institutional support. In South Asia,

participation in jobs should not be viewed solely as access to jobs; transportation participation in this context represents the trade-off between economic opportunity and social acceptance (Joshi et al., 2022).

Mobility Constraints and Gendered Access to Space- Mobility is undoubtedly one of the important factors that determine the success of women in the labour market. In many cases, transportation systems are developed according to the assumption that men travel in a linear pattern in their jobs, whereas women need more complex mobility with many destinations for working purposes, caregiving, and safety. Therefore, women's employment-related choices are influenced not only by the presence of jobs but also by whether transport facilities are safe, cheap, and reliable. Woodcock et al. (2025) argue that mobility positively affects women's integration into the labour market, asserting that good urban mobility lowers women's travel barriers. In India, developing transport infrastructure has played a similar role in women's employment. Nevertheless, accessibility is far from enough, as safety standards continue to shape transport users' choices (Lei et al., 2019b).

Workplace Formation and Institutional Exclusion- A significant reason for the drop in women's representation is workplace formation. Transport institutions often exemplify the formative organisational context that emerges historically and were centred on men's employment roles. Several studies conducted on rural professionals in transportation indicate that the availability of mentorship programmes and networking organisations promotes the positive retention and growth of women professionals (Fraszczyk & Piip, 2019).

Safety, harassment, psychological security and career advancement- Safety and security remain primary concerns. The women who work in this transport field face many risks every day, including harassment, intimidation, verbal abuse, etc. It is commonly found that transport places such as terminal depots, freight terminals, ports or long-distance work may put workers in isolated or predominantly male surroundings. The large number of male employees involved in all higher technical and leadership positions clearly indicates the presence of a glass ceiling in the transport industry. Likewise, Yang et al. (2024) point out that women experience slower promotion rates and fewer opportunities for the strategic business decision-making process in the sphere of logistics and supply chains. Lei et al (2019b) research also emphasises that women's mobility depends much more on public attitudes and behaviour that are determined by the level of their social acceptance

7. Discussion: Reframing Women's Participation in Transport beyond Representation

The global evidence synthesised in this article illustrates that women's role in the transport industry has grown over the last few decades. Yet issues related to gender equality are still far from resolved. Although many improvements can be observed in terms of the education and involvement of women in paid work and technology development in transport operations, women still make up a small percentage of employees in the industry's technical, engineering and management jobs. The literature constantly indicates that the gender inequality in transport is institutional instead of individual. Transport has been traditionally known as the "men's occupation" due to its physically hard nature, hierarchical nature and masculinity. Although advanced technologies have helped many occupations in the field to become easier, the environment that surrounds transport has not changed that much over the last few years. The recruitment process, organisational cultures, as well as promotion, continues to exclude women who have qualified educational and professional experiences (Turnbull, P, 2013b; García-Jiménez et al., 2020). The

findings contradict the conventional beliefs that the lower participation of women can be explained by their choice of profession or their abilities but indicate the continued impact of historical labour forces and organisational practices. The study reflects that there is a major theoretical shift in this research area.

In contrast, contemporary studies emphasise that issues of gender diversity are part of a strategic problem of workforce management, which is necessary for improving companies' resilience and innovation in their operations and ensuring sustainable economic growth. In particular, the transport sector faces the challenges of an ageing population, labour shortage, technological transformation and an increasing demand for highly qualified professionals. Hence, it becomes evident that the increasing role of women in the employment sphere should be treated as an economic necessity, not simply as an issue of equality (Drawe & Zoghi, 2021; Kuzey et al., 2022). The findings challenge the conventional belief that international organisations like the OECD, the International Labour Organisation (ILO), the International Transport Forum (ITF), and the World Bank similarly argue that gender inclusive labour employment boosts organisational outcomes and contributes to sustainability in transportation. (Ng & Acker, 2020b; Dominguez Gonzalez et al., 2023). Technological changes result in new opportunities, but at the same time they also pose challenges. The increase in smart transportation, smart mobility, automation and Industry 5.0 transforms workforce needs, which results in an increased need for digital, analytical and management competencies. Such changes can lead to the elimination of barriers in connection with jobs that are related to physical work, offering women a wider range of job opportunities. (Yang et al., 2024; Narkhede et al., 2025). However, technological change alone would not eliminate gender inequalities. If equal access to STEM education, vocational training, digital competencies and lifelong learning is not provided to women, they will still be underrepresented in new occupations requiring high skills. Thus, the advent of technologies should be accompanied by fair labour policies ensuring equal participation of women in future employment.

From a sociological perspective, research shows that transport should be treated as a social institution and mirrors large gender dynamics in society. Gender equality and transportation jobs are affected by organisational practices but also by expectations regarding women's roles in the family, women's ability to lead companies, their mobility and their technical skills. Existing social norms affect many aspects of careers, including recruitment practices and growth opportunities (Murphy et al., 2024; Porter et al., 2023). Consequently, improving women's participation not only requires institutional changes but also social changes aimed at breaking down gender stereotypes and ensuring equal access to education, employment and leadership positions. Based on the evidence, policy solutions should go beyond isolated recruitment campaigns and formulate an integrated workforce policy. Gender equality must be incorporated into the employment process. In this regard, substantial funds should be invested in technical training and inclusive recruitment practices, mentorship programs, promotion processes, leadership training and workplace policies aimed at providing safe working conditions for women. Achieving gender equality in transport entails moving from a focus on women's numerical involvement toward creating workplaces where women can enter, advance, lead, and determine the future of the global transport industry on equal terms with men.

The evidence presented in this paper suggests that the inequalities women face are not related to a lack of women's talents or ambitions but stem from historical factors in labour markets, institutional traditions, corporate cultures and traditional gender stereotypes. Nevertheless, the developments in the

transport sector open a crucial window of opportunity for revising traditional forms of employment and providing women with a broader scope for professional development. This development alone, however, cannot remove historical inequalities if they are not accompanied by inclusive organisational practices, fair access to educational and skill resources, clarity in career promotion and gender sensitive governance. Diversity brings about innovation, organisational adaptability, and better performance in providing mobility services, and improves service delivery within a complex transport system. In addition, the study points out that it is critically important to increase the number of women in transport, because it would promote more sustainable functioning of the transport sector.

8. Conclusion

Consequently, the study demonstrates that the situation regarding women's participation in the transport sector has significantly improved in recent decades, but true gender equality in this area has yet to be achieved. Women are still confined to a narrow range of occupations while technical and management positions in various transportation sectors are almost exclusively filled by men. Based on the findings, it is reasonable to suggest that the existing inequalities are not based on women's capabilities and aspirations but on the historical labour system, institutional practices and relevant gender stereotypes time-honoured throughout history. This suggests that improving gender equality requires appropriate policies that would not only enable women to enter the labour market but also support their advancement in their professional activities, integration into the workplace and accountability of the institutions. Moreover, with the ongoing digitalisation, automation and sustainable transition in the transport sector, it is becoming increasingly important to integrate gender into workforce planning.

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