UITP ADVANCING PUBLIC TRANSPORT

INTERNATIONAL TRANSPORT WORKERS' FEDERATION

REPORT

GLOBAL EMPLOYMENT IN URBAN PUBLIC TRANSPORT

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EXECUTIVE SUMMARY

This report, commissioned by the International Association of Public Transport (UITP) and the International Transport Workers' Federation (ITF), offers a forward-looking assessment of global employment trends in the urban public transport (UPT) sector. It explores how workforce composition, technological advancement, sustainability imperatives, and social dialogue are reshaping the future of public transport work. Drawing on new data and interviews, the report highlights how workforce composition, technological progress, and climate action are shaping a more sustainable, inclusive, and resilient future for public transport.

Urban public transport remains central to achieving urban climate goals and improving mobility for all. While challenges such as workforce shortages, ageing staff, and technological transitions persist, the sector is responding with increasing innovation, collaboration, and investment in people. Key findings include:

The UPT workforce is evolving, with new opportunities emerging in information technology (IT), engineering, project management, and electric vehicle (EV) systems. While some traditional roles are shifting, overall demand for skilled workers continues to grow, alongside service expansion.

Technology and sustainability are accelerating transformation. The introduction of electric buses, automation, and artificial intelligence (AI) is improving service delivery and environmental performance, while simultaneously creating new training needs and redefining job functions across the sector.

Progress on gender equity is gaining ground, particularly through targeted recruitment, training, and the expansion of roles for women in driving, maintenance, and operational support. Efforts to close gaps in technical and leadership roles are ongoing.

Unions and social dialogue are driving just transitions. Through collective agreements, joint training programmes, and policy collaboration, trade unions are working with employers to ensure that change delivers fair outcomes for workers and improves working conditions.

Future workforce resilience depends on strategic investment. Expanding training pipelines, embracing flexible scheduling, and strengthening diversity and inclusion initiatives will be key to building a capable, future-ready workforce.

The findings point to a sector already taking proactive steps toward a just transition — where green investment, digital innovation workforce development, and social dialogue go hand in hand. With continued collaboration among governments, employers, and trade unions, UPT systems can play a leading role in shaping smarter, greener, and fairer cities — while creating quality jobs and sustainable careers for the future.

Maintenance crew for Metro Warszawskie, Warsaw, Poland

Bus driver with suitcase in Hamburg, Germany

LIST OF ACRONYMS

AI: Artificial Intelligence

AVL: Automatic Vehicle Location

CAMET: China Urban Rail Association

COVID-19: 2019 Coronavirus Disease

DEI: Diversity, Equity, and Inclusion

EIB: European Investment Bank

ETF: European Transport Workers' Federation

EU: European Union

EV: Electric Vehicle

FTE: Full-Time Equivalent Employee

HR: Human Resources

ILO: International Labour Organisation

ITF: International Transport Workers' Federation

km: Kilometre

LATAM: Latin America

MENA: Middle East and North Africa

OECD: Organisation for Economic Co-operation and Development

PTA: Public Transport Authority

PTO: Public Transport Operator

SDG: Sustainable Development Goal

UITP: International Association of Public Transport

UPT: Urban Public Transport

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1. INTRODUCTION

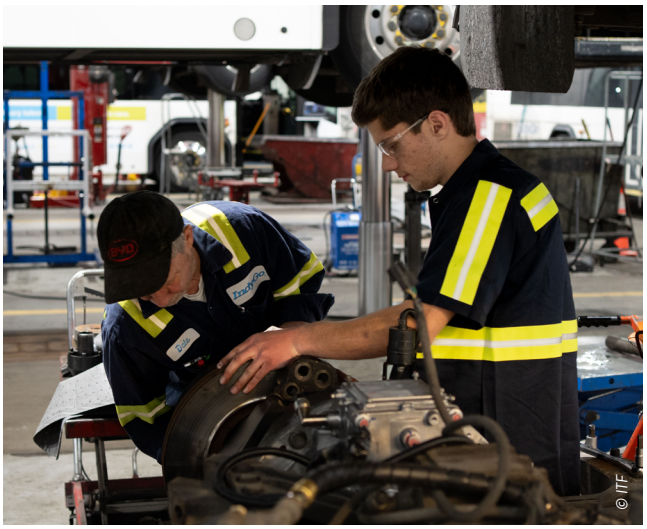
Over the past decade, urban public transport (UPT) systems have been significantly shaped by global population growth, rapid urbanisation, and evolving travel preferences. These trends have necessitated strategic adjustments in operational planning and workforce capabilities. At the same time, technological and environmental initiatives—such as the adoption of cleaner fuels, deployment of electric and autonomous vehicles, and integration of new digital tools—are transforming the urban mobility sector. Such developments are being driven by the broader goals of economic development and sustainability.

However, these transformations come with considerable challenges. The lingering effects of the 2019 coronavirus disease (COVID-19) pandemic have disrupted UPT operations and stretched organisational resources. A key concern is the decline in public transport's modal share, as personal vehicle ownership continues to rise. Data collected by Eurostat and the Organisation for Economic Co-operation and Development (OECD) indicate increased car passenger kilometres (km) and passenger car usage across the European Union (EU)-27 nations. This shift, along with structural factors such as staff shortages, informal operations, and the rise of gig-based shared mobility, has limited employment growth in formal UPT. Despite increasing demand for mobility, UPT workforce expansion has not kept pace.

The global population has grown from 6.8 billion in 2009 to 8 billion, with urbanisation rising from 51% to 57%, boosting the demand for UPT services worldwide. Following a proportionate growth trajectory in 2023, the UPT workforce should have increased to over 11 million strong. However, the UPT workforce expanded modestly in 2023, from 7.3 million to approximately 9 million. Disruptive factors, such as low investment in public transport, have limited the workforce expansion; maintaining or increasing the modal share of public transport could have supported greater workforce growth. These demographic and operational trends highlight the urgent need for strengthening the workforce to effectively meet growing mobility demands.

This report builds upon previous research, particularly the 2011 UITP Observatory of Employment study, by offering a comprehensive and updated dataset. It examines critical themes such as gender balance, workforce age distribution, training initiatives, the impact of new technologies and climate action, job transitions, and decent work conditions. The insights presented are informed by both survey data and structured interviews with public transport operators, authorities, and trade union representatives. The interviews offer valuable qualitative perspectives and provide a foundation for collaborative strategies to address the sector's evolving needs. Nevertheless, workforce shortages have reached critical levels in many countries, across driving, engineering, maintenance, and technology. Effective responses will require coordinated efforts between governments, employers, and unions. One essential first step is addressing the persistent data gap on public transport employment.

This joint International Association of Public Transport and International Transport Workers' Federation (UITP-ITF) research initiative forms part of the UITP Integrated Global Work Programme, adopted in 2024. The programme's first strategic pillar focuses on addressing labour market transformations. The findings in this report serve as a launch point for future joint efforts to meet the evolving demands of the public transport industry and facilitate a just transition for its workforce.



Apprenticeship and mentorship programme in Indianapolis, United States

Female trainee train driver in Cairo, Egypt

1.1. CONTEXT

This report provides updated data on the UPT workforce, as part of ongoing research into how the transport sector is adapting to workforce changes. Tracking and reporting these shifts can help clarify the current state of the industry and inform future strategies. A recent milestone in this area was the International Labour Organisation (ILO) *Technical Meeting on the Future of Decent and Sustainable Work in Urban Transport Services*, 2021, which brought together workers, employers, and governments, along with the ITF and UITP, to develop a shared vision. The meeting underscored the critical role of urban transport in building sustainable cities. It called for greater formalisation of informal jobs, investment in workforce quality, climate responsiveness, digitalisation protections, and strong social dialogue (ILO, 2021). Research by ILO regional offices, such as the 2024 report *Prison on Wheels?* on app-based transport workers in India, highlights the urgent need to address labour insecurity and fragmentation in the sector (ILO, 2024).[1]

Urban public transport, a catalyst of city life, is grappling with significant but often overlooked challenges. UPT employment trends are raising concerns among agencies and operators, highlighting uncertainty and untapped potential in the workforce. It has been over a decade since the last publication outlining the impact the public transport workforce has on our systems on a daily basis. According to UITP's *Observatory of Employment in public transport report 1-April 2011*, in 2009, nearly 7.3 million people were working in the UPT sector (UITP, 2011). This equated to an approximately 1:930 ratio of public transport workers to the population. Sectoral analysis found that Eurasia had 6.8 public transit jobs per 1,000 residents, while Sub-Saharan Africa had only 0.25 jobs per 1,000 residents, likely due to informal public transport being the primary mode of transport. In terms of diversity and sustainability, the report found that women made up only about 14% of the workforce. More information can be found in UITP's *Observatory of employment in public transport report 2-October 2011* (UITP, 2011).

Since then, transport options have expanded, but systemic conditions for mass public transport remain challenging. The historical gender imbalance persists within an ageing workforce, particularly in operational roles such as driving and technical maintenance. An example of this can be found in the EU, where approximately 40% of the workforce is expected to retire within the next decade, highlighting the need for increased recruitment and diversification efforts (Broughton et al., 2024). These shortages are concerning to the degree that organisations are setting out goals to not only attract skilled workers from abroad but also improve their existing workplace and culture to attract women and young workers.

In addition to retirement-driven turnover factors, in some regions, other factors such as relatively low wages, demanding schedules, and challenging working conditions are frequently cited by trade unions and workers' representatives as major reasons for employee turnover. Shortages of drivers and skilled technicians, in turn, can directly impact service reliability and public confidence. Other factors contributing to the labour crisis include competition for talent, skill mismatches, and difficulties in attracting a more diverse workforce. These issues were highlighted in the 2024 UITP report *Improving Attractiveness & Retention of Staff in Public Transport: Recommendations to the Sector* (UITP, 2024). ITF's 2021 report *People's Public Transport Policy* identifies the need for decent, secure jobs with fair wages and safe working conditions. It also emphasises that workers should be actively involved in decisions about new technologies to ensure these changes support job quality and protect workers' rights (ITF, 2021). A 2019 report sponsored through research and cooperation support by ITF and outlines an important distinction in global transport systems between formal and informal services. The Nairobi bus rapid transit (BRT) study investigated informal matatu workers' insecure jobs, poor working conditions, and gender inequities, underscoring the need for formalisation, social protection, and inclusive workplaces. With over 80% unaware of and excluded from BRT planning, workers can risk displacement, echoing ITF's emphasis on worker input in technological transitions to prevent marginalisation. Formalisation is recommended as a mutually beneficial way to create a more sustainable and accessible system (Spooner & Manga, 2019).

1 For more details, see the ILO report Prison on Wheels? Report on Working and Living Conditions of App-based Workers in India, 2024 (ILO, 2024).

Digitalisation and automation are poised to reshape skills and occupational profiles in UPT over the next decade. These changes, coupled with decarbonisation efforts, will necessitate significant upskilling within the workforce. Automation's ability to handle non-routine tasks creates both risks and opportunities, with physical skill-based roles more vulnerable to displacement than cognitive ones like customer service and frontline workers (Broughton et al., 2024; Stanford & Grudnoff, 2020; Combe et al., 2023).

Digital Transformation and Social Dialogue in Urban Public Transport in Europe, a report commissioned by UITP and European Transport Workers' Federation (ETF), outlines the range of effects digitalisation will have on work and employment in the public transport sector. Technological advancements will significantly change employment across four critical domains: job profiles, tasks and skills, working conditions, and women's participation in the sector (Voss & Vitols, 2020). To effectively mitigate potential adverse impacts, robust social dialogue, underpinned by participatory and inclusive planning, is imperative for the strategic deployment of new technologies.

Automation and technological advancements could serve as catalysts for job creation, enabling the recruitment of younger employees into newly created roles such as data analysts and technicians (Wang, 2019). However, barriers persist, especially for women, who face challenges in accessing training and skill certification and licensing. The report *Equality in Reverse: Women's Work and Automation in Public Transport* (ITF Global, 2023) also emphasises this, noting that "automation risks exacerbating gender inequalities unless targeted training programs and inclusive policies are implemented to ensure women's equitable access to emerging roles in the sector."

Various initiatives in recent years have focused to some extent on gender equity in the public transport sector. For example, a Chilean policy issued in cooperation with its National Training and Employment Service outlines training and bus driving licence cost assistance, with emphasis on recruiting women and young people to achieve a yearly increase of 400 bus drivers (Bowen, 2017). Similarly, the 2019 UITP/ITF Global Agreement on Equal Opportunities emphasises that *"promoting equal opportunities for women in public transport requires proactive measures, such as tailored training and mentorship programs, to address structural barriers and enhance women's representation in technical and leadership roles"* (UITP & ITF, 2019). A 2024 study by UITP in cooperation with the European Investment Bank (EIB), *Gender Best Practices in Public Transport*, further supports this, identifying key policies to break gender imbalance barriers, including anti-discrimination measures, prevention and addressing of gender-based assault and harassment, and robust maternity, paternity, and parental leave policies. It notes that gender equality measures in board activities and events remain among the least implemented organisational strategies (UITP & EIB, 2024).

Proactive and adaptive approaches to technology and automation are essential. Paris Metro, for example, is cited to have allocated about 8% of the payroll to training, enhancing opportunities for the workforce to adapt and revisit essential functions of their jobs (Wang, 2019). Formalising new required skills, engaging workers early on, and aligning training with labour market needs can ease transitions and mitigate disruptions (Stanford & Grudnoff, 2020). This can be facilitated by increased investment in training, collaborative planning, and data standardisation, strengthening workforce resilience and advocacy and enabling urgently needed sustainable transport systems to succeed.

Public transport driver in Prague, Czech Republic

1.2. METHODOLOGY & DATA

The methodology adopted in this study followed a multi-phase approach. The first phase involved the development and distribution of a global employment survey. Through the cooperation of UITP members and regional managers, the survey was disseminated to public transport authorities and operators worldwide. The Global Employment in Urban Transport Survey focused on employment trends from 2018 to 2023 (see Table 1 for an overview of the survey data). It also included questions related to training initiatives, the introduction of new technologies, climate action, future workforce needs, and areas of future needs and collaboration. While the survey yielded valuable responses, a secondary data collection effort was also undertaken. This involved the review of publicly available annual reports to supplement and validate regional data. In addition to survey responses, the second phase involved conducting structured interviews with both employers and union representatives in the UPT sector. These interviews provided in-depth qualitative insights and helped contextualise the quantitative data. The data collected does not cover the broader public transport supply chain; rather, it focuses specifically on direct operations. A total of 90 providers contributed data, which formed the foundation of the findings presented in this report.

Empty tram driver seat in Ostrava, Czech Republic

Table 1: Survey data

SURVEY OVERVIEW			
Number of responses	27	Number of mobility services operated/managed by mode:	61
Number of survey responses by organisation	27	Bus	19
Public transport authorities	6	Urban rail	16
Public transport operators	21	Metro	14
Number of responses by region	27	Other	7
Europe	17	Waterborne	3
North America	2	Regulated taxis	2
Asia-Pacific	3	FTE 2023	292,251
LATAM	3	Direct employees	268,727
Africa	1	Female direct employees	58,195
		Total drivers	80,581
		Female drivers	9,258

The survey data was able to capture information on workforce makeup, including breakdown by work category and demographics like age and gender.

The secondary data (see Table 2) mainly covered total direct workforce figures. In some cases, reports included more information on age distribution, turnover rate, and work category amounts. The secondary data provides a view of full-time employment totals for both 2018 and 2023.

The share of representation should be carefully considered, as data was not always readily accessible. The survey focused primarily on formal public transport systems. In regions such as Africa and several countries in the Asia-Pacific—for example, India—it is recognised that, while formal transport providers do exist, the dominant mode of transport is informal, operated in a less regulated and more entrepreneurial manner. Obtaining usable and reliable data that accurately reflects this informal segment of UPT remains challenging. This limitation is one of the key reasons for the absence of data from these regions. The global estimate of total UPT employment was derived by analysing the collected UPT employment data and calculating proportional measures of the workforce relative to the local residential population served, as shown in Table 3.

Table 2: Secondary data

SECONDARY DATA OVERVIEW			
Number of entries	50	Number of mobility services operated/managed by mode:	71
Number of entries by organisation	50	Bus	38
Public transport authorities	7	Urban rail	9
Public transport operators	43	Metro	24
Number of responses by region	50	FTE 2023	823,250
North America	14	Female FTE	22,912
Asia-Pacific	11	**Not all data covered workforce gender statistics*	
MENA	11		
LATAM	5		
Europe	4		
India	4		
Southern Africa	1		

2. GLOBAL TRENDS

The 2011 UITP study estimated that approximately 1 in 930 people worldwide worked in UPT at that time. Over a decade later, this study has found an increase in the proportion of UPT workers, now estimated at 1 in 890 people. This translates to an approximate global UPT workforce of 9 million people and represents a 20% increase in UPT employment over the past decade, showing that UPT has remained a significant source of jobs, employing millions of people around the world.

While employment numbers have increased, the composition of job categories within UPT services has evolved, largely driven by technology adoption and climate action initiatives. The following sections explore these impacts, alongside demographic trends, and provide insights into job training practices that support a just transition.

2.1. EMPLOYMENT TOTALS

From 2018 to 2023, UPT organisations globally showed a general trend of employment growth (see Table 3).

Table 3: Estimated total UPT employment

REGION	EMPLOYEE TO POPULATION RATIO	NUMBER OF DIRECT EMPLOYEES (2023)
Europe	1:600	1,200,000
Asia Pacific	1:700	6,500,000
North America	1:1000	375,000
Middle East & North Africa	1: 1250	400,000
Latin America	1:2000	330,000
World	**1:890**	**~9,000,000**

The Asia-Pacific region accounts for the largest share of UPT employment, followed by Europe. These estimates are based on each region's share of public transport organisations relative to population size. Despite anticipated global growth based on 2009 trends, the UPT workforce in 2023 fell short by more than 2 million potential jobs (see Table 4).

The global survey collected data from companies employing a total of approximately 630,000 workers, covering both direct and indirect employment in 2018 and 2023. In 2023, the average number of full-time employees (FTE) per public transport operator (PTO)—based on 78 survey responses and reports—was approximately 7,500 employees. This excludes data from the China Urban Rail Association (CAMET), which reported 461,000 employees working across Chinese urban rail operators.

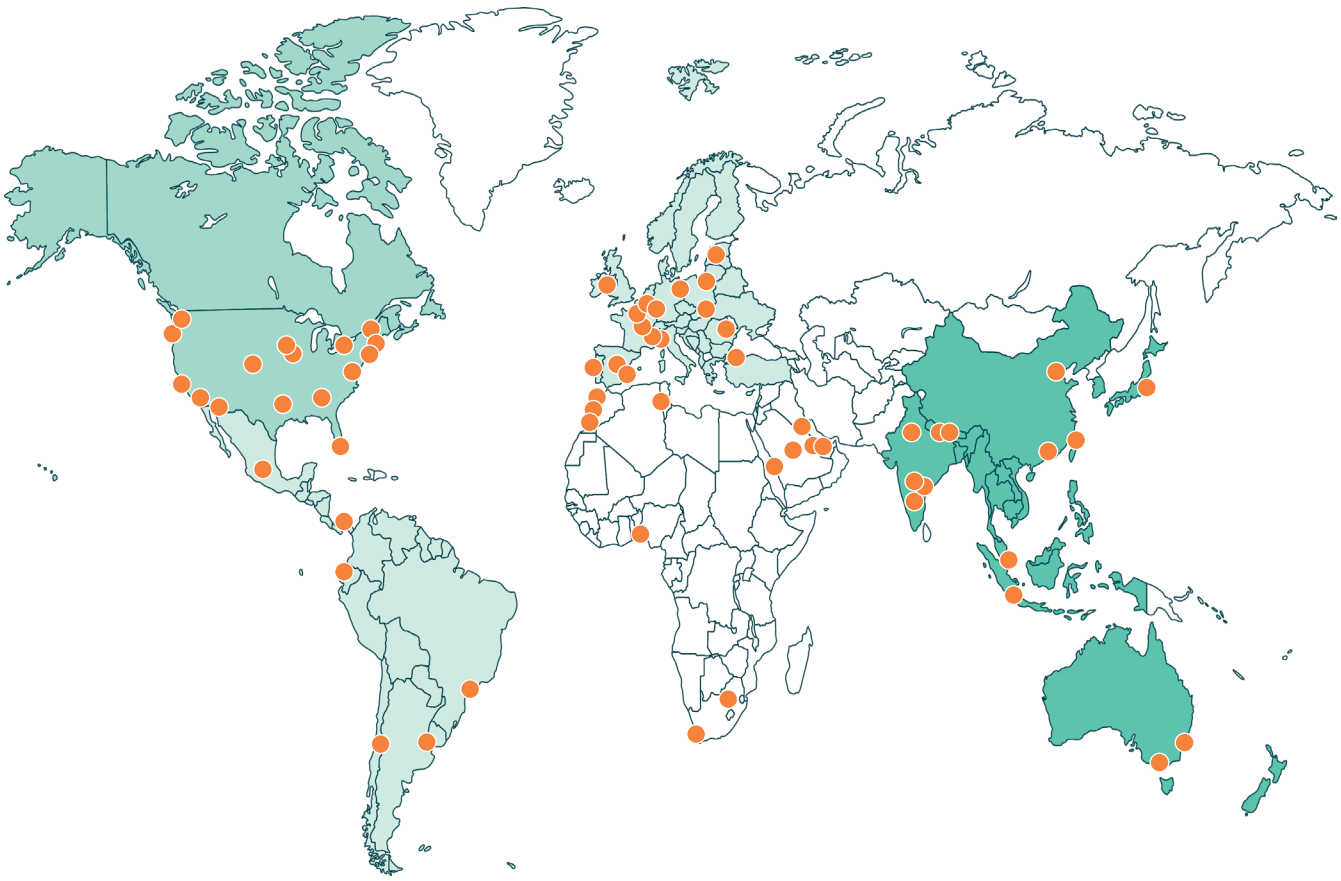
Figure 1 shows the average size of UPT systems across regions and the cities represented in the dataset.

Table 4: 2023 UPT size vs. projected estimate

YEAR	UPT SIZE (MIL.)	PROPORTIONATE TRAJECTORY (MIL.)
2009	7.3	-
2023	9	11.39

Bus mechanic apprentice, USA

Figure 1: Regional average UPT size and surveyed PTO locations



Average number of employees: N/A 0 9,000

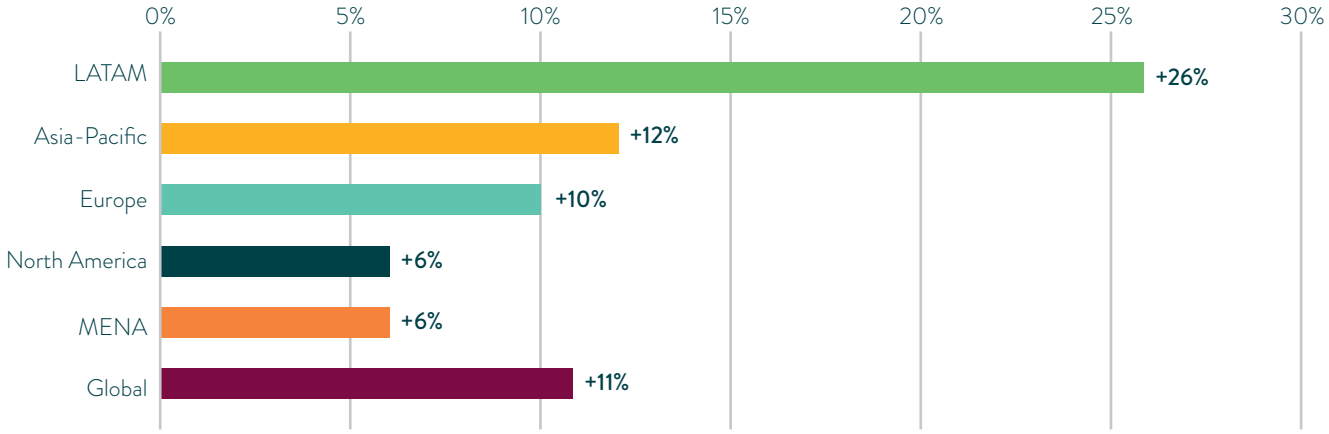
n=76

Source: World Bank Official Boundaries

Overall global full-time employment increased by 11% from 2018 to 2023 (see Figure 2). Leading the regions, Latin America (LATAM) shows signs of strong worker attraction, as indicated in conversation with an organisation in the region. Other regions reported steady employment growth, ranging from 6 to 12 percent. To avoid skewing results, very large UPT organisations were excluded from average growth calculations. While essential to their networks, these large systems can obscure broader employment trends among mid-sized and smaller providers.

DART mechanics

Figure 2: Change in full-time employment, 2018-2023



n=24

UPT Unionised Workforce

Globally, the average share of unionised employment in UPT remained consistently high—at around 60%—from 2018 to 2023. The majority of these unionised workers are employed in operational roles such as drivers, maintenance and engineering staff, and frontline support personnel. This stability suggests a strong tradition of collective bargaining and labour organisation within the UPT sector, particularly in operational areas. Table 5 shows regional variations in union membership between 2018 and 2023.

Table 5: Unions and UPT workforce

REGION	AVERAGE SHARE OF UNIONISED EMPLOYMENT (2018) (EST.)	2023 (EST.)	DIFFERENCE (+/-)
Europe	68%	68%	-
North America	70%	71%	+1%
Asia-Pacific	62%	61%	-1%
LATAM	65%	65%	-
MENA	40%	40%	-

KEY SECTION TAKEAWAYS

- **Workforce Growth:** Global UPT employment grew 20% over the past decade, reaching approximately 9 million workers, with an 11% increase in FTE from 2018 to 2023, led by LATAM.
- **Regional Employment Differences:** Around 70% of large UPT employers are concentrated in Europe and the Asia-Pacific region.
- **High Unionisation:** Union membership remains steady globally, at around 60%, with North America (71%) and Europe (68%) in the lead. This supports strong labour representation and active participation in workforce transitions.

2.2. AGE

Over the next decade (2023–2033), it is estimated that nearly a quarter of the UPT workforce will need to be replaced, largely due to retirement.

Survey data shows that the global UPT workforce is ageing. From 2018 to 2023, the share of older workers increased. At the same time, older workers are facing the need to adapt to new technology, leading to a shift in occupational practice that requires re-training and upskilling. A public transport union member in Chile noted that *"older workers used to play a key role in building the capacity of newer workers within the system."* However, they pointed out that the rapid pace of change, particularly in terms of the rise in digitalisation and automation across occupations, has shifted this dynamic. The evolving skill requirements for new workers have significantly altered the traditional knowledge-sharing discourse.

Between 2018 and 2023, the 55 & over age group increased by 10%, whereas the 36–54 and 35 & under groups decreased by up to 7 percent. These shifts are illustrated in Figure 3 and were corroborated by comments made in an interview with a PTO in Ireland:

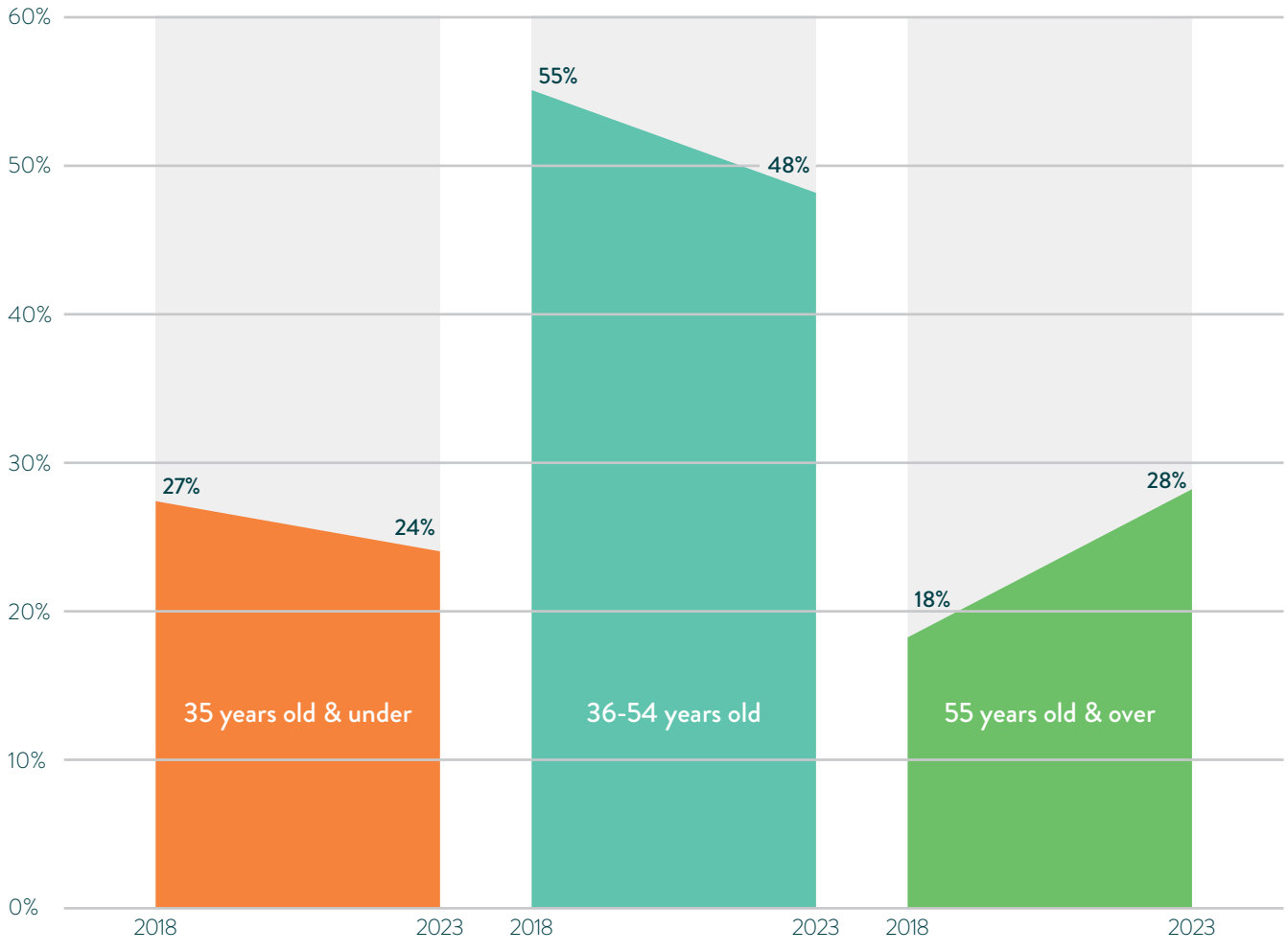
> *"We're seeing big groups of people who all [retire] at the same time...and if you're looking at the average age of people coming to us, it's probably middle age."*

The PTO went on to express concerns over the low share of young people in the workforce. Meanwhile, a South African public transport authority (PTA) emphasised the connection between workforce planning and broader skill development:

> *"The rising unemployment rate poses a threat to us. The limited skill levels of some of our individuals present a risk, as does the shortage of essential skills".*

This highlights the importance of long-term investment in education and youth employment, particularly in technical and frontline roles. Supporting education and aiding young workers can yield significant benefits, helping close skill gaps and increase the representation of youth in the workforce across work categories.

Figure 3: Workforce age distribution



n=33

The graphs below highlight shifts in the average age group share across UPT work categories. As shown in Figure 4, the 35 & under group decreased its participation in engineering & maintenance roles, likely due to working conditions and competition for skills. However, this age group saw no change in the share of drivers and frontline support/supervisor roles. Their most significant increase was in management, from an average 8% share in 2018 to 32% in 2023, with the second-largest gain in administrative/clerical positions. There were also large increases in the 'Other' category and management roles among the 35 & under group.

A transport workers' union in Jakarta, Indonesia emphasised that new technologies have transformed jobs into specialised roles like data science and digital mapping (e.g. Google and CCTV mapping), aligning with younger workers' technical education and the growing demand for a tech-savvy workforce to support an evolving public transport system. In Ireland, technology implementation has led to increases in project management roles as a result of transition management efforts.

The 55 & over workforce (see Figure 5) saw significant share increases across all work categories except drivers, highlighting the fact that UPT organisations value retaining their skills and expertise. This also aligns with the steady ageing of the workforce and reflects lower turnover rates among tenured employees.

Figure 4: 35 & under workforce and work categories

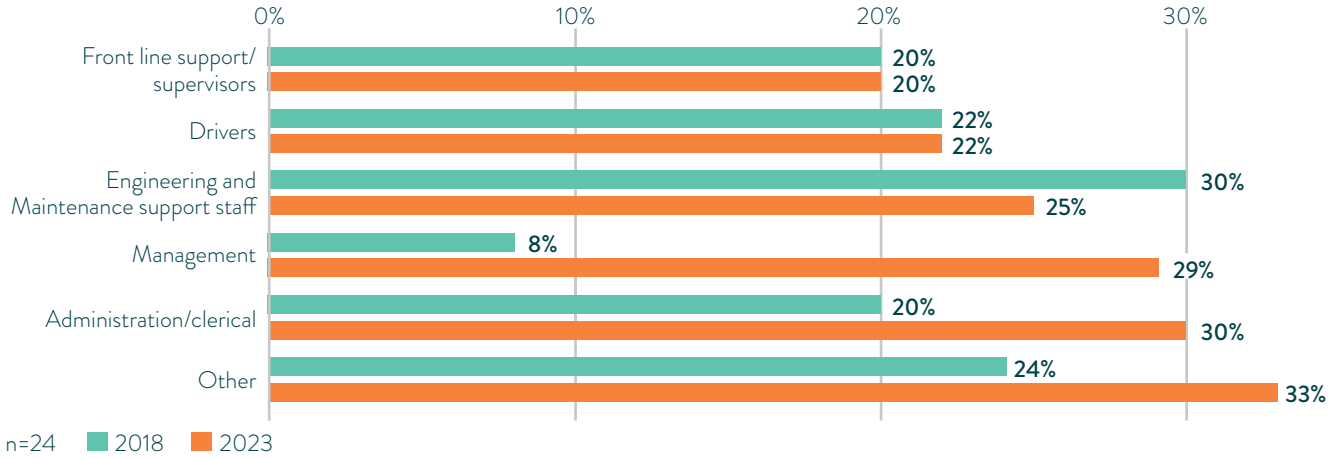
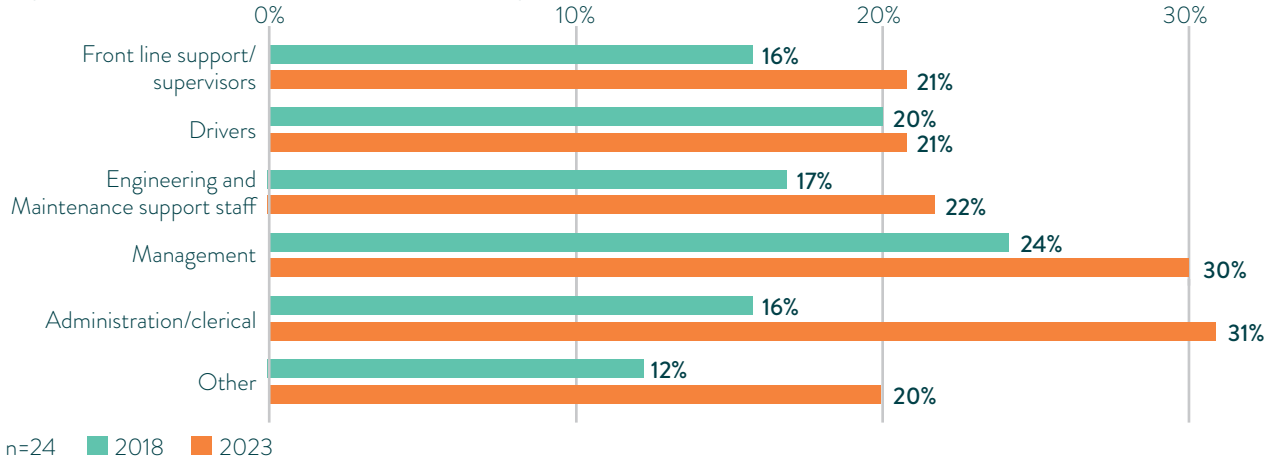


Figure 5: 55 & over workforce and work categories



KEY SECTION TAKEAWAYS

- **Ageing Workforce Concerns:** The ageing of the UPT workforce is resulting in retirement-related shortages.
- **Rise in Tech Roles:** Younger workers are gravitating toward IT, data, and management roles, suggesting that recruitment and training strategies should focus on these roles.

While age is helpful to identify how the sector attracts and retains workers of different ages, it does not tell the whole story. The following section looks at gender-based trends in the UPT workforce.

2.3. GENDER

"While inclusivity is improving, targeted programmes for women in leadership and technical roles need further investment... In the next five years, training programmes will likely expand in these areas, with increased investment in digital training, leadership development, and gender diversity initiatives, not only for women, but also for men" – a PTO in Indonesia.

Despite recent improvements, the UPT workforce remains male-dominated, with women only accounting for around 22% of workers across 51 organisations in 2023—roughly one female worker for every four male workers. While this marks an increase from the 14% female worker share reported in the previous 2011 study, achieving gender parity requires sustained and coordinated efforts. Breaking from traditional occupational norms will foster inclusivity and enhance workforce and system resilience. The transformation of UPT through the application of new technologies offers the potential not only for system-wide improvements but also for enhanced opportunities for women to participate in all roles, including technical ones.

In some regions, proactive gender initiatives are beginning to show results; for example, Indonesian public transport organisations train women through academic programmes, and South America uses quotas. However, certain long-standing practices, like seniority-based scheduling, may unintentionally hinder efforts to create a more inclusive work-life balance. According to data compiled from 51 public transport organisations, global perceptions still reflect male dominance in the industry.

Table 6: Total female UPT workforce representation

REGIONS	OVERALL FEMALE SHARE 2018	OVERALL FEMALE SHARE 2023	DIFFERENCE (+/-)
Europe	21%	21%	-
LATAM	-	23%	NA
Asia-Pacific	13%	17%	4%
North America	26%	30%	4%
MENA	-	9%	NA
Global	21%	22%	1%

n=51

Table 6 highlights a global trend toward increased female representation, but progress varies significantly by region. In Asia-Pacific and North America, the total UPT female workforce has significantly increased, with both regions showing a marked reduction in the gender gap in 2023, although men still made up the majority. This trend was observed in countries like the United States, Canada, Indonesia, Australia, Japan, Singapore, Taiwan, and China. Europe, on the other hand, has a sustained gender gap in the workforce, although female representation has slightly increased over the past decade, from 15% in 2009 to 21% in 2023.

"Regarding the size of the workforce, it increased...units were upgraded. Previously, the service was not as good, but now [it is] getting better. [We] are committed to providing the best services to the customers in Jakarta and its surroundings. But we still have a lack of skilled workers. The number of drivers in [a depot] is about 164 drivers per shift. Female drivers are [a very small portion]." – Transport union representative, Indonesia.

In LATAM, nearly a quarter of the workforce were women in 2023, but there was not enough data from 2018 to make a comparison between the two years. Meanwhile, MENA remains the most male-dominated region, with a small share, less than 10%, of female workers in 2023, indicating a substantial gap. However, given historical data was unavailable during this study's data collection phase, it is possible that this figure still represents an increase. The marginal progress globally, from 14% female representation in 2010 to 22% in 2023, underscores the influence of regional socio-economic and cultural factors on gender equity, suggesting a need for continued targeted efforts in different regions.

2.3.1. Gender and Age Density

Globally, both the survey and secondary data revealed clear correlations between the workforce's age distribution and gender composition. This section examines how the workforce age structure relates to the proportion of female employees.

The 55 & older age group consistently has the lowest proportion of female workers, while the 36–54 age group accounts for the highest. In 2018, female representation was highest in organisations with a greater share of middle-aged workers and fewer young or older employees. The male workforce share was highest in the youngest and oldest age groups.

By 2023, these patterns had shifted. Organisations with a higher proportion of workers aged 35 & under saw a notable increase in female representation. This trend appears to be linked to the recruitment of younger, tech-skilled workers

for roles such as IT, data analysis, operations, and management, which aligns with the changes in the 35 & under work category share discussed in the previous section.

Overall, the data suggests that organisations with a predominantly older workforce continue to have a disproportionately high male share. In contrast, between 2018 and 2023, the 35 & under and 36–54 age groups in the UPT workforce both shifted from male-leaning to more gender-balanced trends (see Figures 6 and 7 for trends in the 35 & under group).

Analysis of the 55 & over age group indicates that older UPT workforces remain predominantly male, reflecting historical hiring patterns. However, recent efforts have focused on recruitment and early-career pathways to secure female employment in UPT. This is evident in the growing number of female drivers and engineers, who are often young, newly educated, and certified professionals entering the workforce; there are early signs of a closing gender gap within the newest generation of workers.

Figure 6: Female workforce share in 35 & under age group

n=35

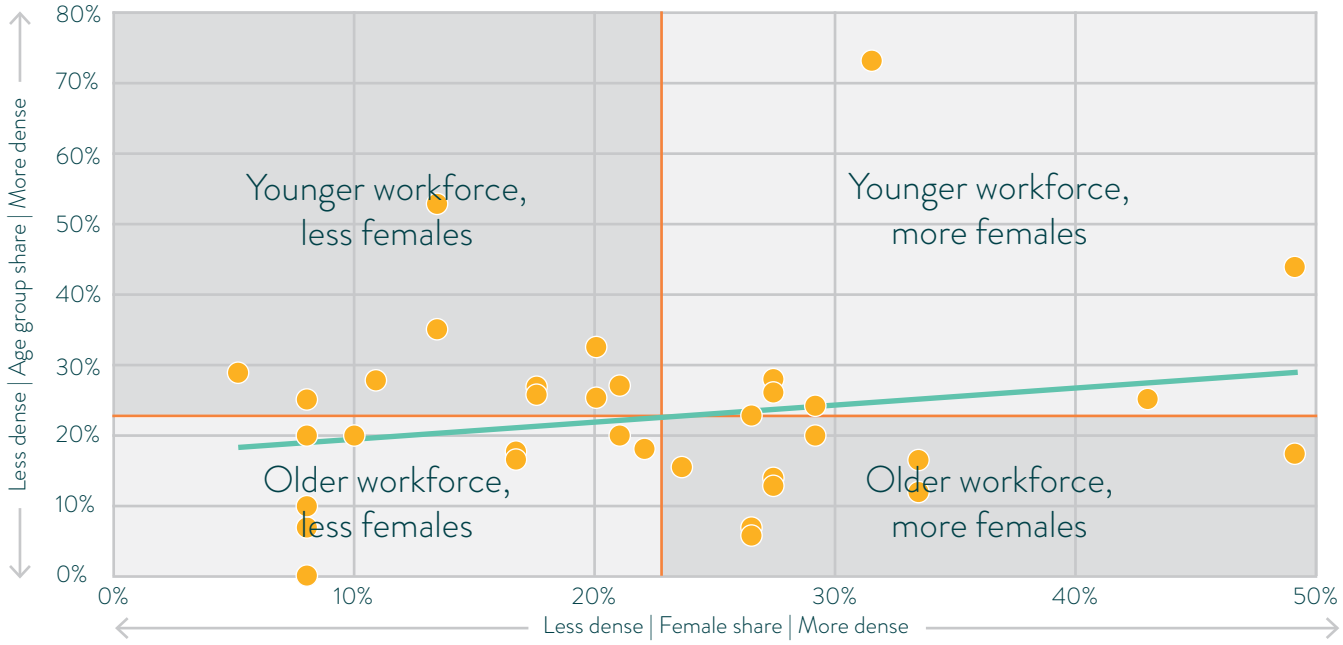
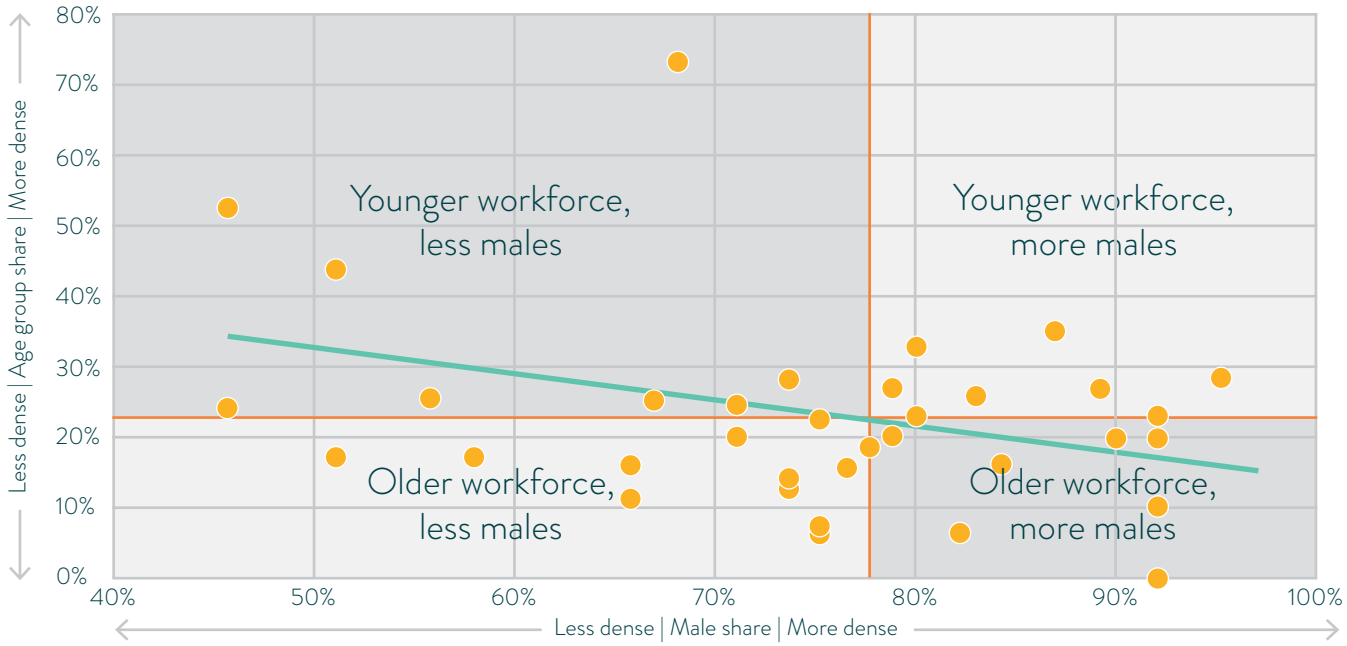


Figure 7: Male workforce share in 35 & under age group

n=35



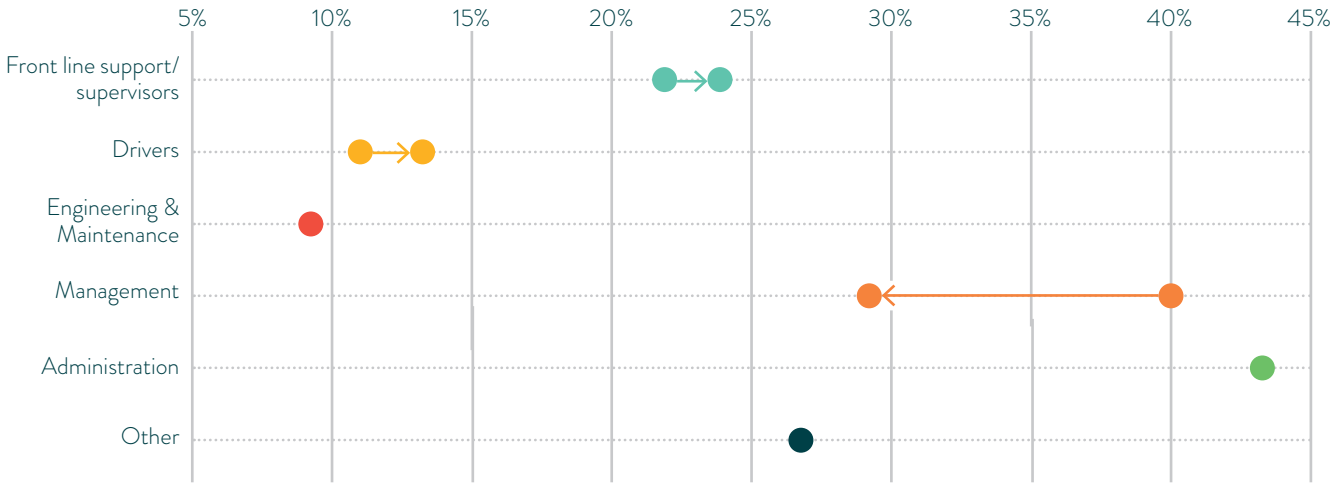
2.3.2. Work Category and Gender

Most work categories in UPT showed very limited or no increase in the share of women workers between 2018 and 2023. The only exceptions were modest gains in driver and frontline support roles. In contrast, management roles experienced a decline in female representation, indicating that while women are entering technical fields, barriers to leadership advancement remain.

This trend suggests that some women may be transitioning from administrative roles into more operational or technical positions. As mentioned above, driver and engineering & maintenance roles have benefited from targeted efforts such as early-start academic apprenticeships, open hiring days, and certification pathways. While these programmes are beginning to build a more diverse workforce in technical roles, the sector still has a long way to go to achieve gender parity (see Figure 8).

Between 2018 and 2023, the gender distribution in public transport roles showed varied progress. In frontline support/supervisor roles, there is a persistent gender gap; male dominance slightly decreased, but female representation only grew marginally, indicating slow progress toward balance. In contrast, administrative roles and the 'Other' category (for example, IT and data, cleaning, etc.) did not experience a decrease in their female representation.

Figure 8: Female workforce share across work categories, 2018-2023



n=25

**Arrows point to 2023 figures – the absence of an arrow indicates no change.*

KEY SECTION TAKEAWAYS

- **Global Female Share Increase:** The global average share of women in UPT rose from 14% in 2009 to 22% in 2023, with much of the growth concentrated in the younger age cohort (35 & under).
- **Age Shift in Male-Dominated UPT:** In 2023, the 35–54 and 55 & older age groups remained heavily male-dominated (with a male share of over 80%), while the 35 & under group showed the greatest signs of gender diversification, particularly in digital and administrative roles.
- **Differences in Female Representation Across Work Categories and Age Groups:** Women remain underrepresented in engineering, driving, and frontline support/supervisor roles, and female representation in management has declined, despite improvements among younger workers. This indicates ongoing structural barriers to leadership and technical advancement.
- **Impactful Recruitment:** While recruitment pipelines and training schemes have begun to increase female participation in some operational roles (for example, drivers), the sector continues to reflect an 80:20 male–female split, underscoring the need for sustained investment in leadership training, technical upskilling, and removal of systemic barriers to career progression.

MAV-START Employee, Hungary

2.4. WORK CATEGORY

The transformation of job categories in public transport is evident. Companies are shifting from traditional staffing models focused on operational roles to a broader mix of professional, technical, and strategic roles. The shift is influenced by service changes, technological upgrades, and expanding urban mobility demands. Roles in management, administration, data and digital systems, and engineering have seen growth. While frontline roles such as drivers still represent the largest share of employment, the workforce composition is evolving and diversifying.

> *"A key focus area is the development of more flexible, cross-functional roles that allow employees to work across different areas like operations and services. This is part of a broader effort to adapt the workforce to new technologies and business needs."* – a PTO employer in Chile.

Table 7: Work category increase in size

WORK CATEGORY	AVERAGE INCREASE
Front line support/supervisors (incl. OCC)	8%
Drivers	13%
Engineering and maintenance support staff	15%
Administration	21%
Others (IT & Data, cleaning staff,...etc.)	28%
Management	34%
(Sample size)	(n=27)

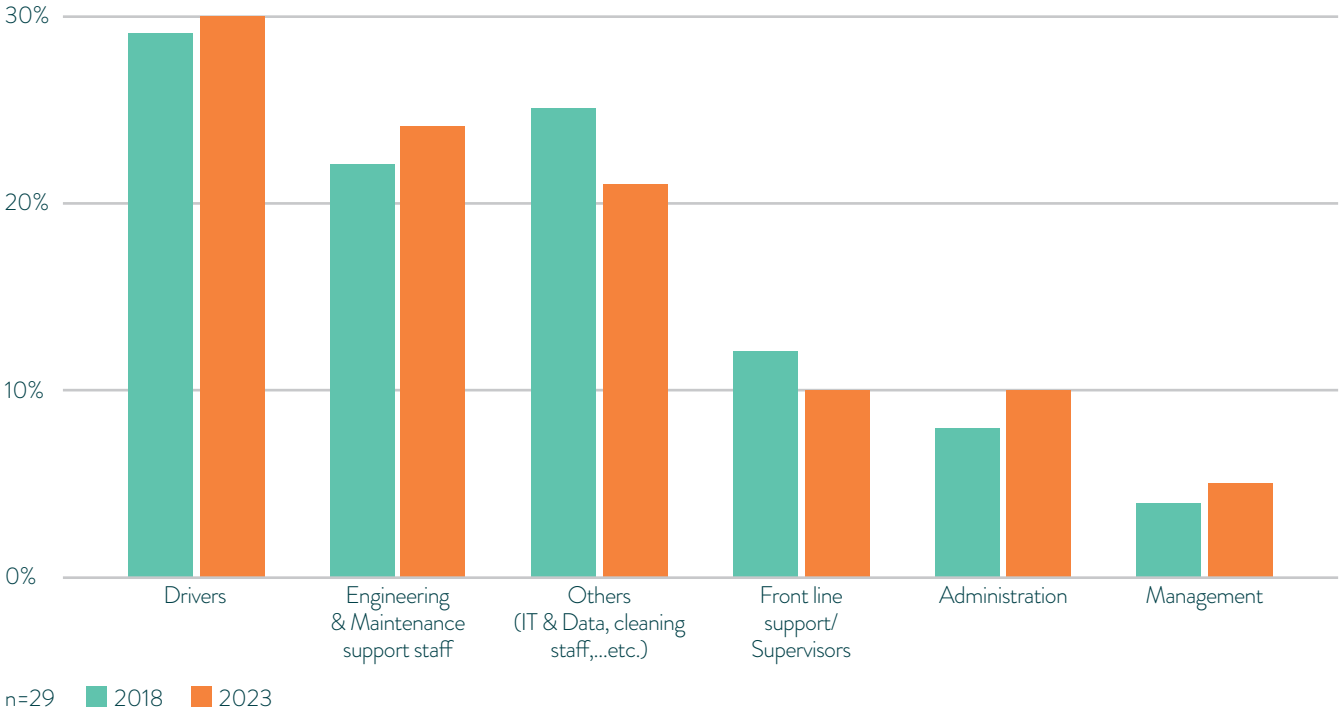
2.4.1. Work Category Size

From 2018 to 2023, most organisations reported increases in the size of their workforce across key job categories (see Table 7). The largest increases were in management, administration, IT and data, and engineering roles—ranging from 15 to 30 percent. The smallest change—8%—was seen in frontline support/supervisors (including operational control centre). There was no decrease in work category roles among 27 organisations, reflecting growth agendas and industry attractiveness. In most of the countries interviewed, organisations reported that the higher concentrations of management, administrative, and IT & data roles are a result of new technology deployment, which is expanding both services and access to UPT. The steady but slow growth in driver, frontline support, and engineering roles—in contrast to the surge in technology and management-focused positions—reflects how fleet expansion is being leveraged not just for capacity but also for broader service improvements.

When examining the overall share of each work category across the surveyed companies, similar patterns emerge (see Figure 9).

Most work categories experienced an increase in workforce size between 2018 and 2023, with the exception of 'Other' and frontline support roles. 'Other' positions—including IT & data, cleaning, and electrician staff—continued to represent a consistent portion of the workforce, accounting for over 20% in total. However, by 2023, frontline workers comprised just 10% of the workforce, down from 12% in 2018. This decline has raised concerns, as frontline workers are typically responsible for managing drivers and ensuring day-to-day service delivery amid increasing system demands. Given the time period, it is reasonable to attribute some of this stagnation to the lingering effects of the COVID-19 pandemic, which may have curtailed broader growth across these roles.

Figure 9: Work category share, 2018 vs. 2023



2.4.2. Work Category and Service Mode

Public transport bus services remain heavily reliant on driver-operated control, with minimal automation deployment. As a PTO employer in Ireland stated:

> *"An electric bus doesn't necessarily mean that we need more employees, but our fleet numbers increasing means that we need more drivers, more engineering, more support employees."*

This highlights the fact that technological change alone does not always drive workforce growth; rather, expansion and capacity building often have a more significant impact on staffing needs. Although drivers remain the largest workforce category, their roles increased by only 10% on average, suggesting that employment levels in this category are not strongly influenced by technological changes.

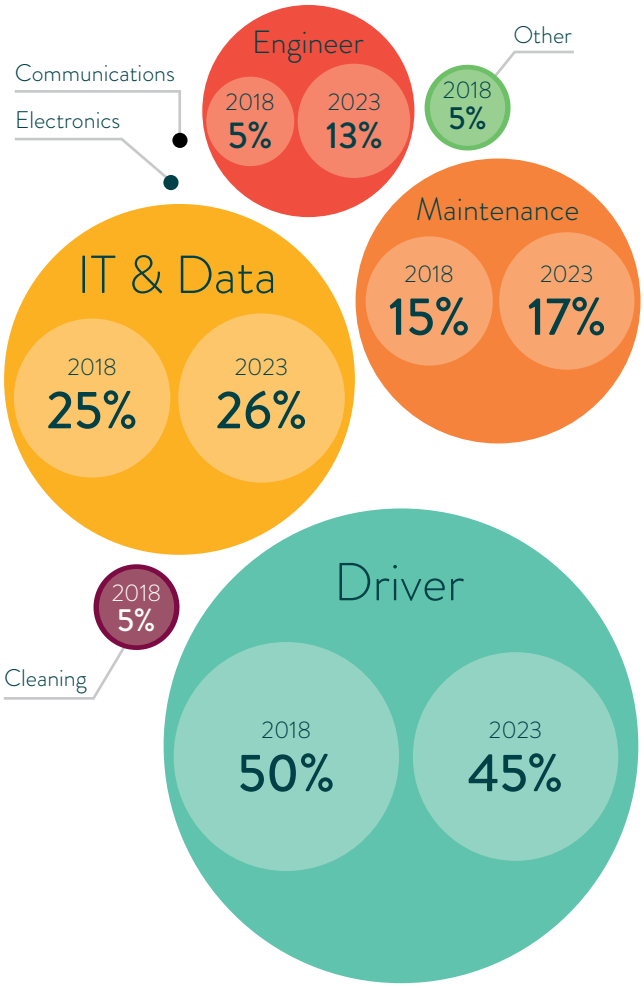
Considering automation, rail-based UPT systems have lower shares of drivers than PTOs that incorporate bus services. Globally, metro services are not entirely automated, but they have integrated higher levels of automation than bus services, while having an insignificant number of layoffs. A 2018 UITP report, *World Report on Metro Automation*, projected that metro line automation could reach up to 3000km worldwide by 2023 (UITP, 2018); new UITP findings from Global Metro Figures 2024 (UITP, 2025) indicate that global rail automation reached 2,279km in 2023.

2.4.3. Work Category and Hard-to-Fill Jobs

The survey results indicated that driver recruitment remains a top priority for PTOs (see Figure 10), reflecting the continued importance of this role to service delivery and UPT expansion. At the same time, there has been a significant increase in demand for engineering roles, along with a steady need for additional maintenance and IT & data personnel. Engineering and maintenance teams have had to adapt to support the integration of new technologies and system-wide growth. Interview accounts from transport union representatives and PTAs in Ireland and South Africa describe how workforce shortages are being addressed through strategies such as the hiring of immigrant labourers, internal staff training programmes, and apprenticeship programmes.

Analysing UPT employment trends provides valuable insight into ongoing transformations within the sector. The next section builds on these findings by examining the reasons behind retention challenges and turnover rates, offering a more complete view of the UPT workforce's evolution.

Figure 10: 'Most difficult job to fill', 2023



n=25

KEY SECTION TAKEAWAYS

- **Tech-Driven Job Growth:** Between 2018 and 2023, roles in management, IT & data, and engineering increased by 15-30%, driven by technological adoption and service expansion. Driver and frontline support roles grew more slowly.
- **Hiring Challenges Addressed:** With UPT expansion driving demand for drivers and engineers, many PTOs have tried to address shortages through internal training, apprenticeships, and targeted recruitment strategies.
- **Workforce Composition Shifts:** Despite overall growth in most work categories, the share of frontline workers declined to 10% in 2023—down from 12% in 2018—, raising concerns, given their central role in driver supervision and service support.

Bus Solaris Urbino Elettrico, Flumini, Italy

2.5. LEAVING THE WORKPLACE

This section was informed by survey responses to questions about the UPT employer turnover rate and, more specifically, some of the reasons why former employees are no longer in their positions, whether voluntarily or involuntarily.

2.5.1. Employee Turnover

The turnover rate is a percentage that represents how many employees leave an organisation within a specific time period, usually a year. Among 21 surveyed UPT providers, turnover increased from 7% in 2018 to 12% in 2023. The table below shows that this trend is consistent for both male and female employees, although women have a slightly higher turnover rate. Overall, the average recorded turnover rate is within the healthy range for an industry, especially one that is undergoing significant operational and structural changes. The source of these changes, ranging from digitalisation and new technology to evolving workforce demographics and roles, can often destabilise employee retention. However, maintaining relatively stable turnover rates during such transitions is a positive signal for the UPT sector.

Table 8: Turnover rates in UPT workforce

N=21	AVERAGE TURNOVER RATE (2018)	AVERAGE TURNOVER RATE (2023)
Female	8%	13%
Male	8%	12%
Global	7%	12%

Research shows that turnover is highest within the first three years of employment, with the main determining factors including long shifts, holiday and night work requirements, and unsocial schedules (Hom, et al., 2008; Goodwill, et al., 2012). These conditions have added to reduced workplace attractiveness, especially among young workers and women. There have been successful collaborative efforts between public transport unions and management to address challenging working conditions such as long hours and rigid work schedules and consequently mitigate the abovementioned factors, and such initiatives have gained significant momentum. Across nearly all conducted interviews with union representatives, workers—supported by effective union negotiations—have begun to benefit from shorter, more comfortable, and more flexible working hour arrangements. In Ireland, workers now enjoy options like a four-day, 30-hour week with full pay and a universal roster with built-in breaks, tailored to improve family-life balance. In Chile, unions have secured a reduction from a 44-hour to 40-hour workweek, alongside automation-related role changes, enhancing job quality. Even in Indonesia, where role adaptation is the focus over work shifts, workers have benefitted from improved conditions through reassignment and, more recently, training as technology is introduced. These improvements reflect the growing trend of effective discussions leading to solutions that sustain service availability and quality while fostering an engaged workforce.

Another factor contributing to turnover in UPT is the growing competition for skilled talent. Beyond the challenges of long working hours and sometimes less favourable working conditions, the sector also faces a limited pool of qualified workers, which, in turn, creates a high-demand, low-supply environment. In Ireland, this issue has surfaced through workforce discussions that reveal deeper concerns. As one worker noted: "We've seen a real struggle in retaining our technical craft workers, because competitors are offering significantly higher wages. It's a constant battle to keep talent when other firms are actively recruiting from our workforce." This perspective underscores the external pressures UPT employers face in retaining staff, especially in technical and specialised roles.

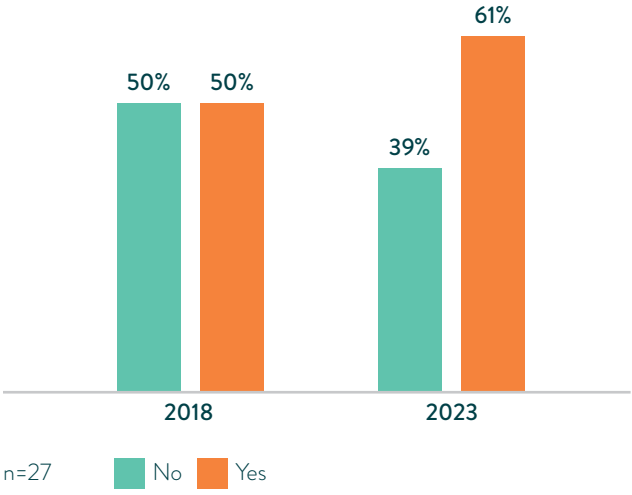
Woman railway worker in India

2.5.2. Exit Interviews

When tackling the issue of employee turnover, it is important to get a better understanding of the context of the departures. Exit interviews have become a valuable tool for understanding why employees leave. These discussions provide insight into what may have been lacking in a role and highlight areas where employees felt dissatisfied. For departing workers, exit interviews also offer a chance to reflect on how the role aligned (or failed to align) with their skills, expectations, and/or career goals. Misalignment between expectations and role responsibilities is often a key factor in early departures. Identifying and addressing these mismatches is crucial for improving retention and hiring practices.

Figure 11 shows a positive trend in the adoption of exit interviews, which aligns with increasing employer concern regarding workplace conditions. Continued adoption will enable employers to better understand staff perspectives and take informed steps to foster transparency, improve conditions, and strengthen employee-employer relationships.

Figure 11: 'Exit interview', 2018-2023



2.5.3 Reasons for Leaving

The survey asked about reasons for employee departures in 2018 and 2023, yielding 15 responses from exit interviews. Below is a graphic depicting the relevance of each reason based on survey responses.

Figure 12: WordMap of reasons for leaving UPT workplace

In 2023, working conditions, career opportunities, and relocation emerged as more significant drivers of departure than in 2018. This suggests that employees are increasingly influenced by workplace environments and limited career prospects, which often prompt decisions to relocate. Meanwhile, retirement, pay, and personal needs/reasons were top reasons for leaving in both years, highlighting their ongoing role in shaping employee decisions.

Improving employee retention is a shared responsibility. Clear communication and open dialogue at all levels are emerging as standard industry practices. When management and workers have opportunities to voice their needs and concerns, it creates a deeper understanding of job realities and contributes to building a more supportive and valued workplace.

KEY SECTION TAKEAWAYS

- **Increased Employee Turnover:** The UPT sector has demonstrated workforce instability, with turnover increasing from 7% in 2018 to 12% in 2023. The slightly higher rate among women (13%) highlights the opportunity to address gender-specific factors that may influence workforce retention.
- **Changing Reasons for Departure:** In 2023, the most common reasons for employee departure included challenging working conditions, limited career opportunities, and relocation. Pay, retirement, and personal needs were key drivers in 2018 and 2023.
- **Collaborative Work Improvements:** Joint efforts between unions and management have led to tangible improvements in working conditions, such as shorter, more flexible hours and higher compensation, enhancing job quality and employee retention in countries like Ireland, Chile, and Indonesia.
- **Exit Interview Insights:** Exit interviews are being adopted by an increasing number of UPT providers, as they offer critical insights into dissatisfaction and job-role misalignment.

A special addition to this report—developed through an international, coordinated effort to advance public transport—is presented in the following section. It features findings from one-on-one interviews with public transport stakeholders, including representatives from PTOs, PTAs, and unions. These conversations provided valuable first-hand accounts of how the workforce has evolved over time, the role of training in supporting workforce sustainability, the influence of new technologies on job functions, and perspectives on future needs and opportunities across the sector.

Women railway workers in India

3. WORKFORCE & TRAINING

3.1. TRAINING AND WORKFORCE CHANGE

This section brings together insights gathered from interviews with both trade union representatives and employers in the industry around the world. It explores how training programmes and workforce composition are evolving to meet technological advancements, sustainability goals, and operational demands across public transport organisations. There is a growing global focus on upskilling in areas such as electric bus maintenance, digitalisation, automation, and AI. However, these priorities are often challenged by regional constraints, including ageing workforces, gender imbalances, limited resources, and staff shortages.

3.1.1. Workforce Composition

> *"Young applicants are scarce, and night shifts go unfilled. Flexible schedules help, but women struggle with seniority rules."* – Transport union representative, Ireland.

Workforce composition reflects regional dynamics shaped by demographics. In Europe, the applicant pool has *"dropped greatly,"* shifting to an employees' market, with older workers (in their 40s to early 60s), retirees, and immigrant labour filling the gaps. Night shifts and skilled technical roles remain understaffed despite flexible shifts (for example, four-day weeks) and apprenticeship programmes, hampered by poaching. Specific diversity, equity and inclusion (DEI) efforts have resulted in more female representation in the workforce, but the industry is still struggling to attract more.

This trend was confirmed by a UPT provider in Asia-Pacific, where, much like in other places, a significant majority of the workforce is over 40 years old, necessitating adaptation strategies. Pipeline programmes have gained traction, with younger recruits and female workers gaining certification and jobs in driver and technical maintenance positions, but specialised skilled roles like data science and mechanics of new technology still face shortages. Interviewees predict these jobs will be filled by a more technically oriented younger generation of employees.

> *"We also launched a pipeline programme last year, Jakarta's first bus captain school. For the first batch, we are focusing on women and empowering them to elevate their skills as bus drivers."* – PTO employer, Indonesia.

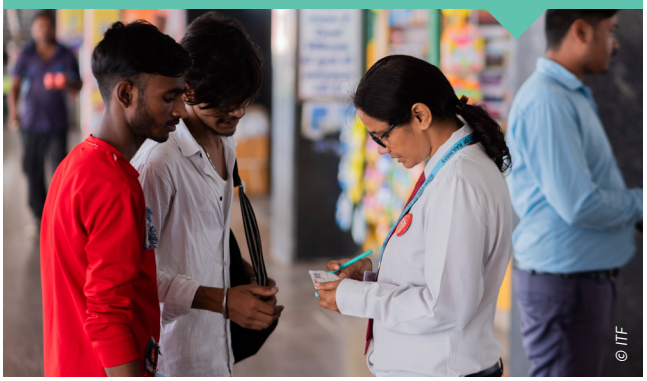
> *"[Having a large] female workforce is a milestone, but we must diversify technical roles—school partnerships are our next step."* – PTO employer, Chile.

New roles have impacted how the workforce structure supports advancements in UPT while learning to balance integration in a participatory way. Job security and decent pay have enhanced conditions and perspectives through joint management and trade union efforts (ITF Global, 2025). However, the growing social disconnect in operational worker relations due to new technologies has generated unease toward adaptation to change. In South Africa, the high youth unemployment rate has led to targeted recruitment efforts aimed at young workers, particularly in support of technological adaptation. UPT engineering services are largely outsourced, but substantial human resources (HR) are still allocated to maintenance roles, ensuring infrastructure keeps pace with growing urban mobility demand.

> *"The sensibility, training, formation, and connection with sustainability [goals] is an important focus [at this time] in our company, for all people, independent of your position... it is critical point. On the other hand, attraction of talent is a focus. Therefore, you must express your connection with these [sustainability] topics, because the people in the new talent generation have high expectations regarding these topics."* – *PTO employer, Chile.*

KEY SECTION TAKEAWAYS

- **Demographic Shifts Persist:** Public transport workforces continue to age globally, with a notable decline in younger applicants. Despite initiatives like flexible scheduling and apprenticeship programmes, night shifts and technical positions remain difficult to fill.
- **Diversity Efforts Gain Ground:** Initiatives to improve diversity have increased women's participation in driving and maintenance roles, although female representation in technical specialisations—such as data science—remains limited. Regional contrasts are evident, with Chile benefiting from strong applicant pools, while South Africa is focusing on youth recruitment to address skill gaps amid high unemployment.


© ITF

3.1.2. Training Initiatives

Training is a cornerstone of adaptation to technological and sustainability transitions, but regional gaps in resources and focus are hindering progress. According to the survey, 9 out of 12 respondent UPT organisations reported increasing their digital =and technology-focused training to approximately 20% of total training activities between 2018 and 2023. At the same time, all 26 respondents confirmed that they provide upskilling opportunities for their staff. For example, in Ireland, workforce training is anchored by safety standards and key performance indicators. A dedicated technical centre supports electric bus skill development. However, training efforts are constrained by limited time, funding, staff capacity, and regulatory hurdles, which restrict the rollout of more holistic programmes.

> *"We'd love to train all our employees on a range of different things... I think really, for us, the barriers against us are funding, time, and just—we have a bus service to run."* – PTO employer, Ireland on challenges in expanding training resources.

In Indonesia, training programmes have evolved to include data analytics, artificial intelligence (AI), and inclusive pipeline programmes that have successfully attracted women to driving roles. However, older workers face greater pressure to adapt, and upskilling in maintenance remains limited, despite a national target of 100% fleet electrification by 2030. Chile has invested in agile, data-driven training and cross-training, supported by union agreements, yet the shift from comprehensive, system-wide training to more task-specific approaches has weakened overall institutional knowledge.

> *"We have training in excellence and a transformation towards flexible roles and sustainability as core structures... We are not only a transport system today—we are an urban system. Therefore, retraining in the areas of operation and services is critical. We cannot afford to fail. Training programmes now emphasise adaptability, digital skills, and operational excellence to meet these demands."* – PTO employer, Chile, on training and development.

Maintenance crew for Metro Warszawskie, Warsaw, Poland

In South Africa, the national focus has shifted to transport engineering and automation. However, limited resources for training—diverted from public administration budgets—remain a challenge amid high unemployment. This was explained by urban mobility leaders in South Africa:

> *"We have a strong need for more technical and engineering expertise, but much of the training focus has historically been on administration. There's a gap in developing the kind of engineering skills needed to maintain and expand transport infrastructure. The challenge is that public-sector training programmes often lean toward policy and administration, but we need hands-on, technical skills to support the growing mobility demands of the city."*

Most employees and some employers mentioned that there is an opportunity to reactivate engagement, not just with management regarding changes, but also with the entire workforce, as digitalisation is used as a tool for both parties.

> *"Training is often provided in leadership and service provision. The impact of the training is good for the company and service provision. Without training, service provision will not be good. [In terms of] time allocation for training, the allocation is [made for] all divisions."* – Transport union representative, Indonesia.

KEY SECTION TAKEAWAYS

- **Training as a Strategic Imperative:** Many UPT organisations have significantly increased their investment in digital and technology training since 2018, with upskilling recognised as essential for workforce sustainability and service quality.
- **Ongoing Structural Barriers:** Despite progress, many systems continue to face constraints such as limited funding, lack of time, staffing shortages, and restrictive regulatory frameworks that prevent broader implementation.
- **Regional Variability in Delivery:** Ireland focuses on electric bus training centres, Indonesia integrates AI and analytics through inclusive pipeline programmes, and Chile applies agile, sustainability-focused retraining. Still, gaps remain—particularly for older workers and in essential technical areas such as maintenance.

4. NEW TECHNOLOGY

This section explores the transformative effects of new technologies and climate initiatives on the workforce, highlighting innovations led by employers and employee perspectives. As AI, automation, and electric buses reshape job functions, climate strategies are driving a push toward sustainability. However, challenges persist in the form of infrastructure limitations and inconsistent employee engagement.

4.1. INTRODUCTION AND IMPACTS

New technologies are redefining workforce structures across regions, while simultaneously bringing needed advancements to service provision. In Ireland, electric buses and an automatic vehicle location (AVL)-linked ticketing system have decreased the need for maintenance and fuelling staff but spurred demand for project management and IT roles, necessitating retraining of engineering teams. While workforce size has remained stable, employees, especially in maintenance and engineering roles, must acquire new skills to work with electric bus technology. To address these changes, accredited technical training centres have been established to provide courses on EV maintenance and repair. In Indonesia, the introduction of cashless payment systems initially resulted in job losses. However, many staff were successfully reassigned to customer service roles. With a national target of 100% electrification by 2030, the need for EV-related technical skills is expected to grow significantly. Employee satisfaction has reportedly improved since 2018 due to better training, union collaboration, and pilot electric bus projects, although concerns remain about past mismanagement and the uncertain effects of future automation.

> *"We are actively hiring specialists in transport policy, planning, sustainability, and intelligent transport systems, particularly in areas like AI-driven fleet management and EV maintenance. However, adaptation remains a hurdle for our older workforce. Many have spent decades working with traditional diesel buses and manual operations, so transitioning to digital tools and automation is not easy. Change management is a significant challenge, as we need to ensure that our experienced employees are not left behind while integrating new technologies."* – PTO employer, Indonesia.

> *"The new technology used is a tapping system (tapping using the cashless card—previously paper-based tickets were used)... There was no significant impact (no layoffs). The workers who were previously involved in the paper-based ticket work have been given other types of work (other roles) such as monitoring and providing assistance to customers in need."* – Transport union representative, Indonesia.

New automated rail lines in Chile have boosted the number of overall work categories, but with reduced numbers of workers per line compared to the conventional lines (Union representative, Chile). The Chilean operator is integrating digital technologies and data analytics to optimise its operations, driving the need for new skill sets and retraining employees for flexible positions. Direct employment levels remain stable, supported by incentives such as shorter work weeks to offset automation impacts.

> *"One of the key things during these negotiations on the new management system with the automated and conventional [metro] lines is that for new workers, they will be directly inserted into these new roles. But for long-tenured workers, it's a voluntary transfer. So, if the worker wants to remain in their current position on a conventional line, they can choose to do so, as the company still needs those roles. However, if workers want to transition and get trained for multifunction roles, they can, with an increase in wages as an incentive"*- Public Transport union, Chile.

In South Africa, AI is being gradually introduced across UPT systems. Voice assistants enhance access to information, and road maintenance machinery is replacing manual labour via natural turnover overseen by unions. A new AI support unit has also been established to help staff access internal policies and guidance more efficiently.

Across various regions, employees expressed a number of concerns, including privacy issues with fatigue detection, job insecurity, skill gaps, rushed rollouts driven by political interests, poor communication, and subcontracted worker exclusion. In this context, trade unions play a crucial role—negotiating role mergers and protecting vulnerable workers.

KEY SECTION TAKEAWAYS

- **Technology Driving Workforce Change:** Electric buses, automation, and AI are reshaping UPT jobs. While demand for fuelling and maintenance roles is declining, new opportunities are emerging in IT, project management, and EV-specific roles. Retraining is critical—particularly for older workers—and must be supported by effective social dialogue.
- **Region-Specific Approaches:** Indonesia has minimised displacement through staff reassignment, Chile is maintaining workforce stability through incentives and retraining, and South Africa is integrating technology gradually to protect jobs amid high unemployment.
- **Workforce Concerns Require Engagement:** Across regions, employee concerns centre on job insecurity, rushed tech rollouts, digital upskilling gaps, and privacy issues. Addressing these issues will require sustained communication, inclusive planning, and strong union involvement.

5. CLIMATE ACTION

Climate action agendas within the transport industry are advancing through the setting of goals to decarbonise transport and adapt to new climate realities. The development and promotion of cleaner, more sustainable modes of transport, such as public transport, are crucial to reducing personal car use and associated emissions. The shift to transport modes such as public transport is referred to as a modal shift. Investment, made possible through political will and the urgent need to limit global warming, is the key driver in supporting effective and long-lasting change, enabling the increased use of public transport.

Modelling by the ITF and C40 suggests that in just five major global cities, climate-focused public transport investment could generate 650,000 jobs. Moreover, the study indicates that doubling public transport usage by 2030 could generate tens of millions of new jobs globally (ITF & C40, 2021). While UPT already employs millions of people, sustained workforce growth both supports and is reinforced by long-term investment in public transport.

5.1. UPT INVESTMENTS

Public transport providers are taking widespread and creative steps to embed climate action into their operations. The most common intervention is the integration of electric buses, but other efforts are emerging—for example, beehives and rainwater retention systems in Ireland and flexible workplace transfers in South Africa that reduce commute times and improve work–life balance. Table 9 categorises thematic areas where investments are being made in climate action-related interventions.

Table 9: UPT investments

RESILIENCE BUILDING	CAPACITY BUILDING	DECARBONISATION
Solar/wind power	Technical upskilling	Electric buses
Sustainability training	Automation and digitalisation	Charging infrastructure
Promotional campaigns	Intelligent fleet management	ESG integration
Partnerships & collaboration	Digital competency	Eco-friendly administrative operations

The majority of investment is going toward electric buses and charging infrastructure, aimed at eliminating tailpipe emissions. Parallel investments in workforce training are equipping staff with new competencies in EV systems, AI, and sustainability practices.[2] In Chile, these efforts are integrated across job categories using environmental, social, and governance (ESG) frameworks, encouraging more flexible and inclusive roles. In Indonesia, active promotion of public transport usage has been made possible through service improvements and real-time tracking in apps like Google Maps. Systems are enhancing resilience with eco-driving training to curb diesel use and exploring solar energy potential, while efficiency is improving thanks to intelligent fleet management, real-time passenger updates, and automation, all designed to increase ridership and streamline operations.

> *"The biggest [investment] would be for the introduction of fully electric buses and the building of charging depots, which has also introduced a huge number of project management roles and increased training programmes for drivers and engineers."* – Public transport employer, Ireland.

> *"To some extent, our hand is also forced... South Africa has gone through a very long period of load shedding of energy insecurity... it was also with that as a backdrop that we understood that we needed to make [electric bus charging facilities] more energy resilient."* – Public transport employer, South Africa.

Women railway workers in India

2 The Clean Bus Europe Platform under the European Commission's Clean Bus Deployment Initiative outlines implications on the workforce, training, and new skills required in new technology adoption (Clean Bus Europe Platform, 2025).

5.2. IMPACTS OF NEW TECHNOLOGY ADOPTION

As noted in the previous section, investment is essential to achieving climate action goals through cleaner and more efficient public transport systems. While outwardly, this is reflected in the integration of new technologies, it is equally important to consider the subsequent internal shifts taking place within the workforce.

Improved Driver Conditions and Collaboration: Quieter cabins in electric buses enhance driver comfort, a change that helps smooth the transition. However, the move toward electrification and broader sustainability initiatives introduces various complexities, which makes social dialogue all the more essential in addressing these changes. It is important for management to support ongoing social dialogue and sustain efforts in maintaining infrastructure and human resources, while simultaneously working toward achieving targets linked to the Sustainable Development Goals (SDGs).

> *"[Electric buses] are cleaner, quieter, and better for the city. There's a real effort to reduce emissions...but it feels like management is more focused on meeting targets than actually making sure the transition works smoothly for drivers."* – Transport union representative, Ireland.

Role Shifts and Training Gaps: The move to electric buses and digital operations pivots supervisor and mechanic roles toward managing digital systems, while driver responsibilities evolve alongside new technology. However, training has sometimes fallen short, leaving workers unprepared for these expanded duties; improvements are underway.

> *"The rapid growth of AI, automation, and digitalisation in public transport requires continuous upskilling. Employees need training in data analytics, intelligent transport systems, and digital operations to enhance efficiency and customer service."* – Public transport employer, Indonesia.

Service Amid Workplace Adjustments: Timely services increase efficiency, which operators see as a driver of reliability. However, they acknowledge the added tension and isolation from contactless systems, which has prompted efforts to balance service goals with employee well-being.

Cost Savings and Sustainability Gains: By reducing administrative costs and environmental impact, employers are strengthening system resilience, even as they work to ensure staff remain connected to these achievements.

> *"[We] are investing in EV training programmes, sustainable transport policies, and partnerships with green technology providers and circular economy supply chains such as reusable merchandise and souvenirs."* – Public transport employer, Indonesia.

Employers are making strides in sustainability and workforce support, improving conditions and creating opportunities, while navigating hurdles like training delays and isolation to keep the transition equitable and effective.

Whether it is new technology or climate action initiatives, public transport organisations and workers alike recognise the need to lessen the negative impacts of interventions, fostering a just transition that prioritises fairness in this shift. Across all countries interviewed, the need for cooperation and open dialogue were emphasised, to ensure every voice is heard on issues like implementation, training, and job creation or transformation. All of these topics should be viewed through the lens of fair pay, reasonable hours, safe conditions, and better work-life balance to equitably support workers and the services they provide on a daily basis.

KEY SECTION TAKEAWAYS

- **Green Investment with Workforce Benefits:** Public transport providers are investing in electric buses, charging infrastructure, and sustainability training to support decarbonisation. These efforts improve working conditions—particularly for drivers—and create new roles in EV and digital systems.
- **Challenges in the Transition:** Technology adoption should align with timely training, infrastructure readiness, and worker preparedness. Employers are working to balance cost efficiency, environmental goals, and worker well-being to ensure an equitable transition.

Bus driver in a HOCHBAHN electric bus in Hamburg, Germany

6. UNION SUPPORT AND FUTURE NEEDS & OPPORTUNITIES

6.1 SOCIAL DIALOGUE AND COOPERATIVE EFFORTS

Unions and employers across public transport organisations are actively engaging in social dialogue to navigate technological, environmental, and social transformations. Unions can play a vital role in advocating for workers' rights while collaborating with employers to promote fair and inclusive employment practices.

The survey results show that the strongest areas of successful social dialogue include workplace policy development, workforce training, safety oversight, inclusivity efforts, and productivity improvements. Examples such as collective agreements, joint training programmes, and safety trustees demonstrate how partnerships between unions and employers can align interests, enhance skills, and uphold labour standards. Interview insights support this, revealing that social dialogue often play a decisive role in ensuring a just transition for the workforce.

Gender equity and improved working conditions are also core concerns for social dialogue. These initiatives aim to support female recruitment and employee retention, while also promoting women to leadership positions. In South America, cross-functional roles in UPT organisations have contributed to greater gender diversity.

Unions also foster collaboration between workers and management. Working closely with the public sector and operators, unions ensure that electric bus adoption is accompanied by proper worker training. Employers in South Africa note that union collaboration aligns technology integration with productivity goals, using natural turnover to adopt new systems without displacing workers.

KEY SECTION TAKEAWAYS

- **Social Dialogue Fostering Change:** Trade unions play a central role in navigating automation and climate change by securing job protection, negotiating dual-function agreements, and promoting structured dialogue.
- **Partnerships that Deliver Results:** Social dialogue efforts have led to joint training, safety oversight, and inclusivity initiatives, strengthening both worker protection and service delivery.
- **Gender Equity and Training Access:** Unions support gender-diverse leadership pipelines and champion expanded training for electric bus maintenance and digital skills, ensuring workers are prepared for evolving roles.

6.2. FUTURE THREATS AND OPPORTUNITIES

The interviews from union representatives and employers highlighted a dynamic future for public transport organisations, driven by technological, environmental, and workforce shifts. These changes present both threats and opportunities that will shape the industry in the coming years.

The most significant staffing opportunities are tied to innovation and diversification strategies. Programmes like apprenticeships and graduate schemes are helping attract talent in key areas such as driving, IT, and engineering. Stable employment, supported by collective agreements, fosters workforce retention. Meanwhile, service expansion and growing adoption of AI and automation is fuelling demand for roles in project management, maintenance, and sustainability. Green skill development is also attracting environmentally conscious jobseekers. Growth is anticipated in IT and executive positions to support electric bus operations; UPT stakeholders in Indonesia, Chile, and South Africa expect increased future demand for AI specialists, data analysts, and EV experts.

However, staffing challenges persist. Many regions report shortages of qualified staff—particularly drivers, engineers, and mechanics. The average age of UPT workers is around 50, raising concerns about digital adaptation and retirement. Older workers often struggle with AI and digital tools, while at the same time, it is challenging to recruit younger, technically skilled workers—for roles such as data analysts, cybersecurity experts, and EV technicians—, even amid high unemployment. This highlights a disconnect between the available workforce and the evolving needs of the industry. Employee turnover rates increased between 2018 and 2023, spurring concerns of an initial job displacement shock of technological transitions in the UPT workforce.

The introduction of new technology has led to lost jobs due to inadequate preparation and complete replacement of job functions. One example is the introduction of paperless ticketing leading to layoffs. Furthermore, concerns exist regarding long-term job security, as the transition to electric buses reduces maintenance requirements. Employers in some regions have acknowledged that despite electrification, there has been no significant increase in employee numbers.

Economic and funding challenges threaten the sustainability of UPT providers. Training resources in financial terms, time, and available content are all areas where improvement is desired by both employers and employees. The loss of knowledge transfer also presents a significant risk, as there are reduced opportunities for older workers to mentor younger employees, potentially threatening the long-term development of workforce expertise.

Future workforce needs are being reshaped by the push for more flexible shift systems, work–life balance, and inclusive employment practices. Employers and employees share a common vision of continuous career development, which is supported by ongoing training and skill enhancement to ensure alignment with evolving industry demands.

Expansion projects will drive workforce growth. This is complemented by climate leadership and sustainability efforts positioned to provide additional benefits for workers and communities. Fundamentally, diversity and talent development initiatives are expected to strengthen the workforce, which, in turn, will strengthen service provision. This will help make our transport systems ready for innovative transformations, backed by an agile and skilled workforce.

KEY SECTION TAKEAWAYS

- **Workforce Pressures Intensify:** Automation, an ageing workforce, persistent skill gaps, and limited training budgets are straining recruitment and retention, while turnover continues to rise.
- **Specialised Roles on the Rise:** Technological and green transitions are creating new opportunities in IT, AI, EV maintenance, and data analysis, as described by Indonesia, Chile, and South Africa, indicating a global trend.
- **Strategies for Resilience:** Future-ready workforces will depend on flexible scheduling, ongoing training, and improved work–life balance, along with health and safety protections and targeted diversity initiatives to sustain public transport systems throughout ongoing transformation.

Woman railway worker in India

CONCLUSION

This report presents a comprehensive picture of the global UPT workforce in a period marked by profound transformation. Across all regions, public transport systems are adapting to intersecting pressures—climate imperatives, rapid digitalisation, shifting demographics, and evolving service expectations. Amid these changes, a key insight has emerged: the resilience and sustainability of public transport are inextricably linked to the quality, preparedness, and inclusivity of its workforce. The transition to electric buses, AI-driven systems, and automation is not only reshaping operational demands but also redefining the roles, skills, and expectations of those who keep transport systems running. While technology has the potential to enhance service quality and environmental performance, its adoption must be done in dialogue with trade unions to avoid worker displacement and social disconnection. Workforce shortages, ageing employee profiles, and persistent skill gaps continue to challenge the sector's stability. Nevertheless, these challenges are also catalysing innovation. Unions and employers are increasingly collaborating to develop training pipelines, secure job protections, and expand opportunities for underrepresented groups, especially women and younger workers. Such efforts underscore the importance of social dialogue and roundtable discussions in building a just and future-ready transition. As the sector accelerates toward achieving climate goals, workforce development must remain a strategic priority. Investments in clean technologies must be matched by investments in people—through inclusive recruitment, targeted upskilling, and equitable working conditions. At the same time, public transport can play a pivotal role in fostering green jobs, supporting community resilience, and promoting urban sustainability. Ultimately, the future of public transport will be shaped, not only by innovation and infrastructure, but also by its ability to value, retain, and empower those who operate, maintain, and manage it. With strong partnerships between governments, employers, and trade unions, the sector is well-positioned to meet today's challenges and seize tomorrow's opportunities—creating a public transport system that is efficient, equitable, and enduring.

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This is an official Report of UITP, the International Association of Public Transport. UITP represents the interests of key players in the public transport sector. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport worldwide.

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