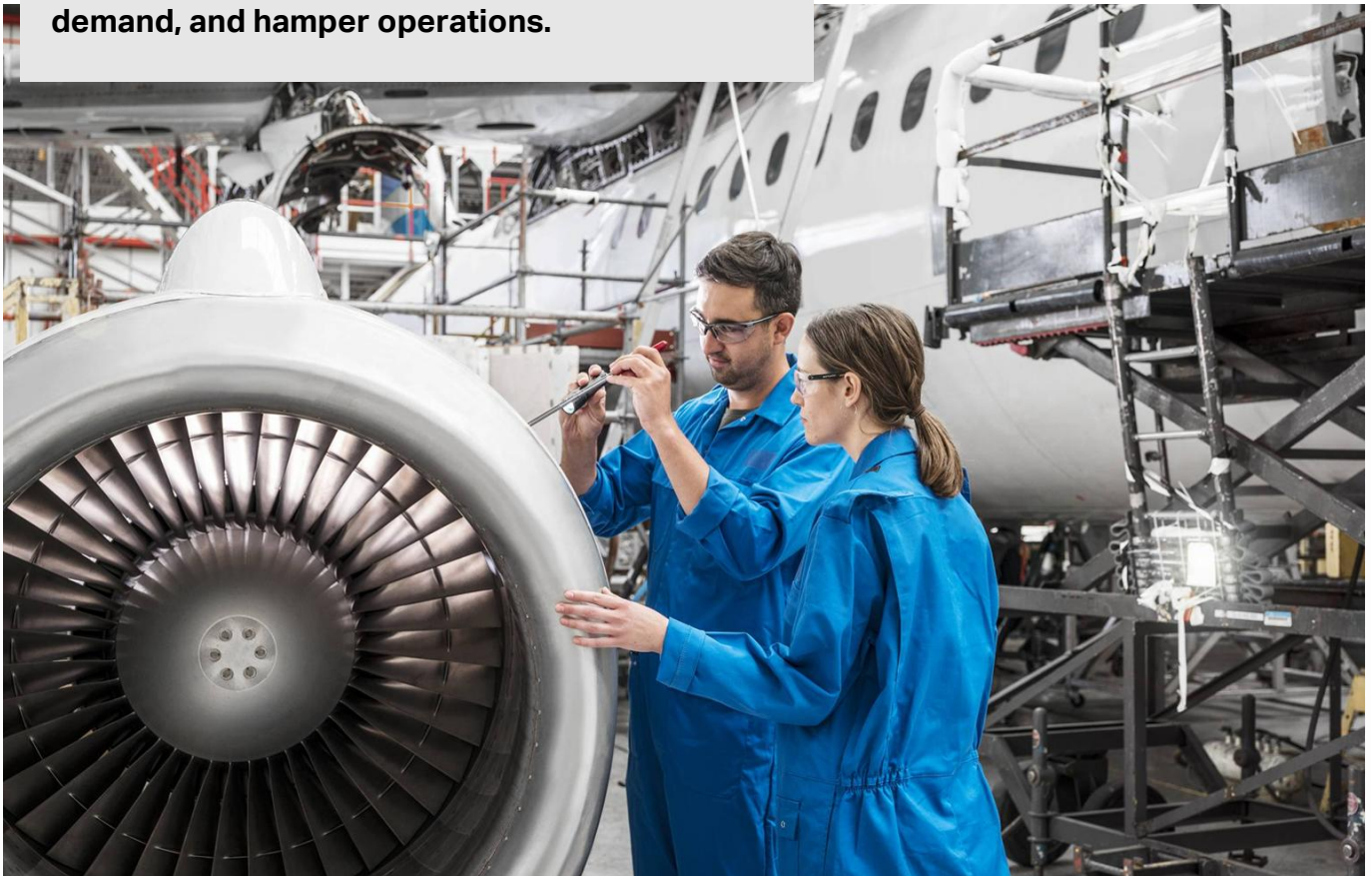


Labor Licensing and Mobility in Air Transport

October 2026

Occupational licensing requirements have become prevalent across job markets globally. In the aviation sector such requirements are concentrated in several mission-critical occupations.

While safety and security are unequivocal imperatives, the complex regulatory framework limits labor mobility and restricts access to labor. This can cap the sector's ability to meet demand, and hamper operations.



Contents

Introduction	3
Licensing in the labor market around the world	4
Labor inter-dependencies	7
Aviation occupational licensing	8
Global oversight	8
Regional harmonization	8
National implementation	8
The importance of labor mobility in air transport	10
1. Geographic mismatch	10
2. Hyper-specialization	11
How could global labor mobility be enhanced?	11
Initiatives to reduce fragmentation in licensing requirements	12
Are there other potential mobility solutions?	14
Conclusion	15
Appendix 1: Regulatory requirements in other industries	16
References	18

List of Tables

Table 1: Share of licensed, certified, and unregulated workers in the EU, % of total	6
Table 2: Regulatory requirements for specific occupations in aviation in Switzerland	9
Table 3: Summary benefits of MRAs – a qualitative review	14

List of Charts

Chart 1: Occupational licensing share of labor force across nations	4
Chart 2: Projected outbound RPKs by region 2024 versus 2050, billion, under the mid-growth scenario	10

Introduction

Labor mobility, the ability of workers to move between jobs, employers, or locations in response to employment opportunities, is an important driver of economic growth and competitiveness. It enables labor to respond to market opportunities, facilitates the transfer of skills and knowledge, and supports economic and social development. Labor mobility helps alleviate labor and skills shortages, supporting production and service delivery. High labor mobility can therefore be viewed as an indicator of economic dynamism within a country or region.

Because airlines operate across international borders, the mobility of aviation professionals is a key factor shaping long-term workforce planning and recruitment strategies. Understanding the challenges associated with international labor mobility, together with the broader regulatory environment governing the sector provides an essential foundation for assessing the industry's future human capital requirements.

The air transport industry is expected to grow at an average annual rate of 3.1% between 2024 and 2050, doubling in size over the period.¹ A substantial increase in the aviation workforce will be required to support this growth. CAE² forecasts that nearly 1.3 million new commercial aviation professionals will be needed by 2034 across a range of occupations. Approximately 56% of this demand will replace retirements and natural attrition, while the remainder will support industry expansion.³ The 2026 Boeing Pilot and Technician Outlook (PTO) estimates that the global commercial aviation industry will require 674,000 new pilots and 728,000 technicians over the next 20 years to sustain global fleet operations.⁴

When rapidly growing regions are unable to expand training capacity quickly enough, and mature markets face demographic pressures, the industry relies heavily on the international mobility of licensed professionals to address regional labor shortages.⁵ Long-term workforce planning must therefore address two key variables: the capacity to expand the global supply of qualified personnel and the regulatory frameworks governing their international mobility.

The industry's reliance on international labor mobility to address localized labor shortages is a well-established structural feature of aviation. In fast-growing markets, importing labor becomes necessary when fleet expansion outpaces local training capacity.⁶ Major Middle Eastern carriers, for example, rely extensively on expatriate workforces to support their global hub operations, while Chinese airlines have historically recruited foreign captains during periods of rapid growth.^{7,8} In the United States, shortages driven by mandatory pilot retirements have increasingly led operators to sponsor foreign pilots through employment-based visa programs such as EB-2 and EB-3.⁹ In both cases, the cross-border movement of licensed professionals serves as a critical mechanism for balancing regional labor supply and demand and preventing workforce shortages from constraining airline operations. Labor mobility can therefore play an effective role in helping to address near-term imbalances in labor supply and demand, but it is insufficient on its own to address deeper structural imbalances in aviation labor markets.

Although demographic change and labor scarcity have emerged as broader macro-economic challenges across many sectors, air transport faces additional structural barriers that limit labor market flexibility.¹⁰ Aircraft and route networks operate globally, yet the training infrastructure and labor pools needed to support them remain largely geographically fixed. Moreover, as ICAO notes, "the lack of harmonized

¹ (IATA S&E, 2026). Mid-growth scenario. Global RPKs (trillion) will increase from 9.04 to 20.81 over the period.

² Previously known as Canadian Aviation Electronics Ltd., a technology company providing training and other solutions to aviation professionals, CAE is a world leader in providing simulation and modelling technologies and integrated training solutions.

³ The (CAE, 2025) forecasts estimate a need for 267,000 new commercial aviation pilots and 347,000 new maintenance technicians, along with 71,000 new air traffic control professionals.

⁴ (Boeing, 2026).

⁵ (ICAO, Next generation of aviation professionals, 2024).

⁶ "The availability of aviation personnel is not evenly balanced across different States and regions, leading to imbalances in workforce distribution... promoting mutual recognition of qualifications, licenses, and certifications holds significant potential in fostering global mobility and addressing regional disparities and workforce shortage." (ICAO, Next generation of aviation professionals, 2024).

⁷ (Vertas Management, 2015) and (O'Connell, 2011).

⁸ (Bloomberg, 2016).

⁹ (Harvey, 2022).

¹⁰ (Cela, 2020).

competencies in some aviation disciplines and a lack of awareness of the variety and reality of careers in aviation amongst youth are further threatening the sustainability of the global aviation network's workforce".¹¹

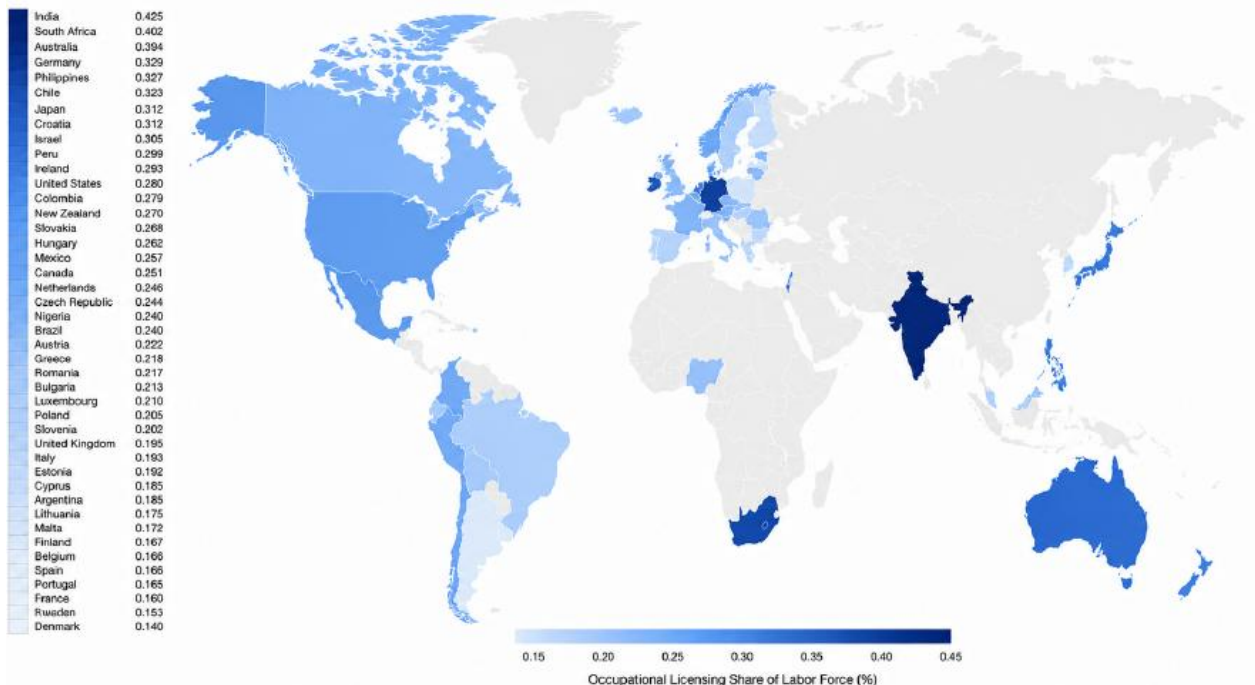
The international movement of aviation professionals is further shaped by the aviation licensing framework. This framework comprises a rigorous, multi-layered regulatory system designed to ensure that personnel meet stringent competency, medical, and training requirements before performing safety-critical functions. Such oversight is a fundamental component of the industry's safety-first approach. The challenge is whether barriers to labor mobility can be reduced without compromising aviation safety, and whether easing such barriers could even improve safety.

Three of the most highly regulated, safety-critical occupations in the aviation sector are flight crew (pilots and instructors), aircraft maintenance personnel, notably engineers (AMPs), and air traffic controllers (ATCOs). Licensing and labor mobility for these professions operate within a hybrid system that combines a degree of global standardization with national sovereignty and regulatory fragmentation at the regional and national levels. The following sections examine the implications of this framework for the airline industry and its workforce.

Licensing in the labor market around the world

Occupational licensing - a government requirement to entering an occupation demonstrating a minimum degree of competence to legally practice certain professions - has expanded dramatically over time and become a widespread form of labor market regulation around the world (Chart 1).¹² For example, the share of the US labor force with an occupational license requirement has increased steadily from 5% in 1950s to about 25% now.¹³

Chart 1: Occupational licensing share of labor force across nations



Source: Kleiner & Morris (2026). Note: Licensing estimates are based on nationally representative surveys harmonized following the occupational licensing definitions of Morris & Krueger (2013), with post-stratification reweighting using IPUMS population benchmarks. Darker shading indicates a larger share of workers employed in licensed occupations. Countries in gray were not included in the sample.

¹¹ ICAO. (2016). ICAO Training Report: Ensuring dreams take flight. Vol 6. No 2.

¹² (Kleiner, Occupational Licensing, 2000).

¹³ (Hartley & Kleiner, 2026).

Policymakers typically impose occupational license requirements as means to protect consumers and ensure quality. Safety concerns provide the strongest rationale for licensing in high-stakes fields such as healthcare, where patients cannot easily assess quality and the consequences of substandard care are severe. Likewise, licensing is standard for supervisory roles in construction to ensure adherence to complex building codes and public safety regulations. In aviation, licensing is intended to protect public safety, ensure technical competence, and maintain global trust through standardized rules. Many other occupations that do not pose comparable risks to consumers or the public are still highly, and unnecessarily, regulated. Ultimately, deciding whether a profession truly requires a license should hinge on the inherent risks of the job and the specific public interest being protected.¹⁴

There is a central trade-off between occupational licensing and labor supply: while licensing may improve service quality by ensuring that practitioners meet minimum competency standards, it creates barriers to entry and mobility, restricting labor supply and worker mobility into licensed occupations. Licensing can confer benefits in the form of consumer protection, but it imposes costs and generates economic inefficiencies, increasing the price of the service and limiting access to competitive labor markets.¹⁵

Growing evidence indicates that licensing requirements have significant consequences on labor market outcomes:

- Occupational licensing can inadvertently have cartel-like effects on the market. A cartel is a group of suppliers that restrict entry or output to keep prices above the competitive level. Licensing restricts entry to the labor market. This tends to raise the cost of entry and drive up wages in the licensed market. Licensed professionals can command a wage premium of 6% to 19%.¹⁶ Some of this wage premium reflects genuinely higher human capital investments. However, the resulting relative scarcity of labor supply can also let incumbents charge above-competitive wages. This, in turn, hurts consumers who will face higher prices or reduced availability of the service.
- Expanding training capacity and reducing unnecessary barriers to entering the occupation could increase availability of high skilled personnel and ease wage pressures in occupations experiencing shortages. This can help airlines manage labor costs while maintaining safety standards.
- Licensing creates significant barriers to geographic and occupational mobility. In the US, interstate migration drops by 3% to 5% for workers facing state-specific licensing exams compared to unregulated peers, whereas widely recognized national standards carry no such penalty.¹⁷ Conversely, when jurisdictions implement mutual license recognition, employment grows without sacrificing quality.¹⁸ Strict, localized rules not only lead to the inefficient allocation of talent across regions but also prevent workers from easily switching between occupations.¹⁹ Mutual recognition of licenses and harmonized standards can enable airlines to recruit talent more quickly across markets. Greater labor mobility can help airlines fill vacancies faster, reduce operational disruptions, and deploy personnel where they are most needed. This is particularly important during periods of rapid growth, seasonal demand, or during the phase of operational recovery following major disruptions.
- Licensing exacerbates economic inequality. It effectively acts as a wealth transfer from consumers to licensed workers through inflated service prices.²⁰ Because it predominantly raises wages for higher-earning professionals, it lacks the broader, equalizing wage effects typically seen with collective bargaining. More accessible pathways into licensed occupations can expand the talent pipeline and help address long-term workforce shortages. A larger and more diverse workforce can reduce the recruitment challenges and the training bottlenecks that airlines face.
- Also, at the aggregate level, licensing is associated with negative macro-economic implications. Countries with a high prevalence of occupational licensing tend to exhibit lower GDP per capita, larger

¹⁴ (OECD, 2024).

¹⁵ (Kleiner & Kudrle, 2000); (Kleiner & Todd, 2009), (Hartley & Kleiner, 2026).

¹⁶ (Gittleman, Klee, & Kleiner, 2018) (Kleiner & Kudrle, 2000)

¹⁷ (Johnson & Kleiner, 2020)

¹⁸ (Bae & Timmons, 2023).

¹⁹ (Kleiner & Xu, 2025).

²⁰ (Kleiner, 2000)

informal economic sectors, and weaker overall governance.²¹ For aviation, a more mobile and adaptable workforce can improve operational resilience and reduce shortages that increase costs and constrain growth. Better workforce availability ultimately supports airline productivity, connectivity, and service reliability.

Although many occupations are regulated worldwide, a lack of consistent data makes it difficult to study these rules on a global scale. As a result, most existing research - spearheaded by prominent scholars such as Morris Kleiner - has historically focused heavily on the United States where data is more readily available. Existing studies generally highlight that while professions such as law and medicine are universally regulated, others, including architecture, engineering, and real estate, vary significantly by jurisdiction. Studies that include licensing in aviation in the analysis are hard to find. Here we provide an overview of the global aviation licensing ecosystem, detailing how current regulatory frameworks dictate and constrain labor mobility. Understanding and ultimately addressing structural licensing bottlenecks is important to ensure that airlines can meet the growing demand for air transport.

Proportion of licensed, certified, and unregulated workers across industries

Aviation occupations encompass a wide range of roles, and licensing requirements and classifications vary across these and across jurisdictions, including states, regions, and countries.

For some context, an overview of regulated (licensed and certified) and unregulated occupations across a range of industries in the European Union is provided in Table 1. The transportation and communication category includes aviation and the specificities regarding aviation are therefore dissimulated.

Occupation types

- *Licensed occupations* require a legal government permit to practice.
- *Certified occupations* require proof of skills or competence issued by a professional board.
- *Non-regulated professions* are not subject to any legal employment requirements.

Source: ENIC-NARIC (2026). Non-regulated professions.

Table 1: Share of licensed, certified, and unregulated workers in the EU, % of total

Industry	Licensed	Certified	Unregulated
Health and social work	36.7%	19.6%	43.8%
Public administration	34.9%	19.8%	45.3%
Education	27.1%	22.6%	50.3%
Transportation and communications*	26.7%	21.2%	52.0%
Finance, real state	24.2%	21.7%	54.1%
Construction or energy	21.3%	26.8%	51.9%
Professional services	20.9%	21.9%	57.1%
Cultural activities	14.8%	21.0%	64.1%
Agriculture	14.1%	21.1%	64.9%
Manufacturing of products	12.8%	22.8%	64.4%
Wholesale or retail trade	10.6%	19.9%	69.5%
Hotel and restaurants	9.6%	20.6%	69.8%

Source: Koumenta & Pagliero (2019). It uses data from the EU survey of regulated occupations. Civilian employed population aged 15 or older. Transportation refers to all means of transport, including aviation. See Appendix 1 for a broader comparative analysis.

To attempt to isolate the numbers pertaining to aviation specifically and given the lack of a comprehensive global inventory of regulated aviation occupations, we use US data as a proxy. The US aviation workforce

²¹ (Hartley & Kleiner, 2026).

comprises roughly 0.8-0.9 million airline-industry workers on a full-time employee basis.²² Including aircraft manufacturing, the combined airline-and-aircraft workforce is roughly 1.1-1.2 million workers.²³ Within this workforce, a substantial subset performs occupations subject to individual FAA certification or other regulatory qualification requirements, including pilots, aircraft mechanics, and ATCOs. An estimated 0.31 million workers²⁴ are employed in occupations subject to individual FAA certification or credentialing requirements. These represent approximately one-third (34-39%) of the operational workforce and about one-fourth of the aviation workforce (26-28%). That would be roughly in line with the findings regarding transportation and communications in Table 1.

This would suggest that aviation is more subject to occupational licensing requirements than the financial sector, another highly regulated sector, while still not being a notable outlier, ranking below health, public administration, and maybe also education. The challenge for the aviation sector is therefore less about a general prevalence of licensing requirements than the highly stringent licensing and certification requirements in safety-critical occupations that are essential to the functioning of the air transport system. As a result, barriers to entry arising from licensing, certification, and recurrent training can have a disproportionate impact on workforce availability and labor mobility in these mission-critical occupations.

Labor inter-dependencies

Key elements of the aviation value chain are the aircraft operators, air traffic control (ATC), and airports.²⁵

Despite being functionally independent with clearly defined responsibilities and regulatory frameworks, these entities employ personnel whose activities are inherently interrelated and require continuous coordination and integration to ensure the safe, efficient, and globally harmonized operation of air transport operations. Their activities are tightly synchronized through shared communication systems, standardized procedures, and real-time collaboration, ensuring the seamless operation of the overall system.

For instance, aircraft operators rely on ATC for safe routing, separation, and real-time traffic flow management, while simultaneously depending on airports and service providers for ground services such as aircraft handling, fueling, and passenger processing. ATC, in turn, coordinates closely with flight crew and airport operators to manage traffic flows efficiently, especially during peak operations or in times of disruption.²⁶ Airports act as the physical interface where these interactions converge, requiring constant communication with operators and controllers to ensure smooth arrival, departure and turnaround processes and to maintain safety standards.²⁷ Any disruption in one area can quickly propagate through the system, highlighting the degree of interdependence and the vital need for coordination among all actors.²⁸

The seamless integration of aircraft operators, ATC, and airport authorities does not consist only of operational coordination but is fundamentally underpinned by a rigorous regulatory framework governing the workforce in the industry. Because a disruption or failure in one sector can ripple through the entire network, international and national regulations mandate that the individuals in specific occupations managing these interfaces – including flight crew, AMPs, and ATCOs – have standardized, high-level competencies.

Certification and oversight ensure that every actor can meet the real-time demands of a complex, interconnected environment and licensing and license recognition procedures are fundamentally safety driven. In such a tightly integrated system, constraints in workforce availability cannot be viewed in isolation; they can affect the performance, capacity, and resilience of the overall air transport system.

²² (BTS, 2026).

²³ The Bureau Labor Statistics (BLS) reports about 246.9 thousand workers at the end of 2025.

²⁴ These include aircraft pilots and flight engineers (151,190), aircraft mechanics and service technicians (138,090) and ATCOs (22,510) using data from the (BLS, 2025).

²⁵ (Byers, 2016).

²⁶ (Ferrara, 2013).

²⁷ (Cui, et al., 2024).

²⁸ (Simillon, 2017).

Aviation occupational licensing

Occupational requirements in aviation form a multi-layered regulatory system that combines international standards and national implementation and enforcement. In some regions, supranational authorities also exercise regulatory powers conferred by their member states.

Global oversight

At the global level, the International Civil Aviation Organization (ICAO), the UN specialized agency covering international air transport, develops Standards and Recommended Practices (SARPs)²⁹ for a wide range of matters including licensing, training, competency requirements, and other safety-related aspects of aviation occupations.³⁰ This creates a common global baseline across all 193 ICAO member states. ICAO's SARPs establish the basis for global regulatory harmonization. While neither category is self-executing in domestic law, contracting states are expected to comply with ICAO Standards and are required under Article 38 of the Chicago Convention to notify ICAO of any differences. Recommended Practices represent provisions with which states endeavor to comply. This mechanism aims to promote a high degree of global regulatory harmonization while still allowing states some flexibility and autonomy in implementation to accommodate specific considerations or unique circumstances.

Regional harmonization

At the regional level, various supranational bodies have been established to develop and implement common regulatory frameworks that member states must apply.

In the EU, this harmonization occurs through binding EU Regulations enacted by the European Commission (EC). The European Union Aviation Safety Agency (EASA) supports the EC by providing technical groundwork – which draws upon ICAO SARPs to draft technical opinions. In that sense, EASA supplements these hard-law requirements by preparing Acceptable Means of Compliance (AMC) and Guidance Material (GM), which member states and national aviation authorities use to demonstrate and ensure uniform compliance. EU regulations, including those regarding aviation licensing and training, are directly binding across EU member states. For the other EASA member states, they are incorporated into legal frameworks through the relevant European Economic Area (EEA) and/or bilateral agreements, thereby standardizing these occupational regulations across multiple national systems.^{31, 32}

Elsewhere, the South Asia Regional Initiative (SARI)³³ focuses on regional regulatory harmonization in the aviation industry in that region. Similarly, the Latin American Aviation Regulations (LARs) aim to standardize personnel licensing requirements across member states. Consistent with ICAO standards, these efforts seek to facilitate license recognition, harmonized training requirements, and support regional mobility.³⁴

National implementation

Within this global and regional context, aviation occupational regulations are typically established at the national level but are strongly shaped by international standards and regional frameworks. A country's aviation authority is responsible for regulating civil aviation safety, airworthiness, and licensing. These agencies also oversee the creation and enforcement of professional requirements in their territory, including licensing of flight crew, ATCOs, AMPs, and other regulated aviation roles. National regulations may impose

²⁹ See also [DGCA/60 - DP/03/24 Rev.1](#)

³⁰ (Aquilina, 2024).

³¹ (EASA, 2019).

³² Norway, Iceland, and Liechtenstein operate through the EEA framework. Switzerland participates through the EU-Switzerland Air transport Agreement.

³³ (Searif-Sari.org).

³⁴ See (ICAO, 2022).

more stringent technical requirements than those embodied in the ICAO SARPs. Hence, mutual license recognition between states is not guaranteed and might indeed be thwarted.

In addition, national frameworks can include specific administrative conditions - such as citizenship restrictions - that go beyond technical criteria and may further hinder the recognition of licenses between states. Language proficiency in aviation is governed by a universally standardized safety framework. ICAO requires the achievement of the English Language Proficiency Level 4 as a minimum operational level, equally valid within all member states.³⁵ In contrast with other occupations, this global linguistic standard mitigates localized communication barriers and actively facilitates cross-border labor mobility. It does not, however, prevent some local authorities from putting into place additional local language requirements.

This multi-layered system of global standard-setting with, at times, regional and national specificities create both consistency and fragmentation. While technical standards may align, legal and administrative requirements often differ, complicating workforce mobility. The localized implementation and enforcement of these regulations intersect with several other factors – including national security requirements, immigration laws and language requirements, administrative friction, and industrial relations – which limit fluid international workforce mobility and turn the potentially globally mobile aviation workforce into more localized labor markets.

To illustrate the interrelated nature of the current regulatory regime, a high-level summary of Switzerland's regulatory framework is presented in Table 2.

Table 2: Regulatory requirements for specific occupations in aviation in Switzerland

Regulatory environment (Laws, Regulations, and Recommendations)			
Occupation	National	Regional	International
Flight Crew	Regulated by the Federal Office of Civil Aviation (FOCA) under Swiss aviation law; issues licenses, medical certification, and oversees compliance with national adaptations of EASA rules. NAAs and CAAs have the power to create, interpret, and enforce regulations that can, at times, exceed or "overregulate" regional or international requirements.	Commission Regulation (EU) No 1178/2011 (Appendix I – Part-FCL) and amendments EASA Part-FCL (Flight crew licensing) , define licensing requirements, training standards, type ratings, and medical requirements across member states. Approved Training Organizations (ATOs) provide training in accordance with the applicable Part-ORA/Part-FCL requirements and are subject to competent-authority oversight. EU Aircrew regulations: Commission Regulation (EU) No 1178/2011 , amended by Commission Regulation (EU) 2026/781	ICAO Annex 1 – Amendment 179 (2022) establishes global standards for personnel licensing, including minimum requirements for pilot training and certification.

³⁵ These Language Proficiency Requirements (LPRs) are codified principally in ICAO SARPs - Annex 1 (*Personnel Licensing*) and are complemented by related operational provisions in Annexes 6, 10, and 11. International recognition of licenses and certificates under Article 33 provides an additional incentive for states to maintain compliance with these standards.

Maintenance personnel	Certified and overseen by FOCA , responsible for the approval of maintenance organizations and personnel licensing at national level.	Within the EU framework, EASA Part-66 governs aircraft maintenance licenses/certifying staff. Part-145 governs approved maintenance organizations. Part-147 governs maintenance training organizations.	ICAO Annex 1 – Amendment 179 (2022) and Annex 6 – Part I (operations of aircraft) provide baseline global standards for maintenance personnel and aircraft airworthiness.
Air traffic controllers (ATCO)	Licensed and supervised by FOCA and national air navigation service providers (e.g., Skyguide); includes language proficiency and unit-specific ratings.	Commission Regulation (EU) 2015/340 , Part ATCO, which specifically governs ATCO licenses, ratings, endorsements, training organizations and medical certification	ICAO Annex 1 – Amendment 179 (2022) (licensing) and Annex 11 (air traffic services) define global standards for ATC training, procedures, and airspace management.

Source: IATA Sustainability and Economics.

The importance of labor mobility in air transport

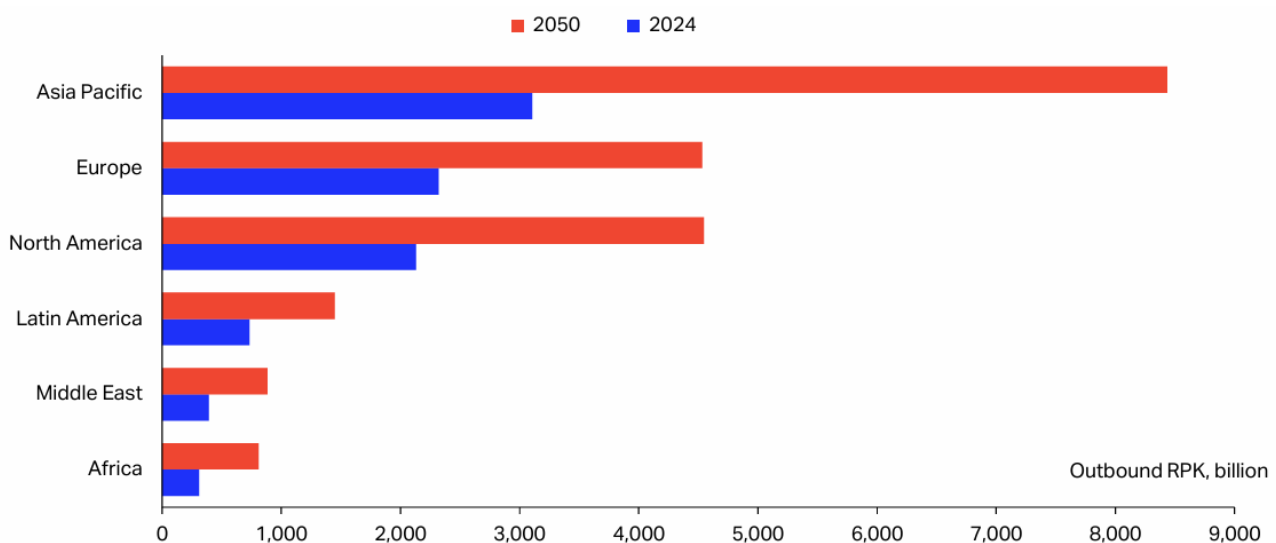
Cross-border mobility is beneficial for many sectors, and it is critical for aviation. Several reasons explain why labor mobility is particularly important for aviation.

1. Geographic mismatch

Aviation demand is growing unevenly across the globe:

- The IATA long-term air passenger demand forecast for 2024-2050 suggests that demand growth in the mature aviation markets, such as North America and Europe (2.8% and 2.5% CAGR, respectively) will be significantly outpaced by emerging markets, notably Asia Pacific (3.8%) and Africa (3.6%).³⁶ Indeed, the Asia Pacific region is expected to contribute almost half (46%) of the total increase in global RPK (**Chart 2**).

Chart 2: Projected outbound RPKs by region 2024 versus 2050, billion, under the mid-growth scenario



³⁶ See projected RPK growth by region and region pair in mid scenario for the period between 2024 -2050 in the (IATA S&E, 2026).

Source: IATA Sustainability and Economics. IATA Long Term Air Transport Passenger Demand Projections.

- In the high-growth emerging aviation markets, training capacity is likely to constitute a bottleneck with respect to satisfying the growing demand for labor. This is the case also in mature aviation markets where demographics add pressure rather than demand growth. For example, over the next 15 years, an estimated 42,000 US airline pilots are expected to retire, and by 2045, approximately half of the current US airline pilot workforce is projected to have retired.³⁷

It is important to note that even if global training capacity is fully utilized, the delay in training qualified personnel means the supply gap cannot be closed quickly. Cross-border labor mobility therefore acts as the immediate bridge.

2. Hyper-specialization

Many occupations in aviation are very specialized in nature. Flight crew and ATCOs are obvious examples. But the same arguments can also be applied to other critical occupations – for example, motor vehicle mechanics are not immediately interchangeable with AMPs. Time is required for training and upskilling. In part, this relates to the level of regulation and competencies required, as well as the nature of the aviation labor ecosystem. Aircraft maintenance operations require highly specialized technicians possessing precise, type-rated certifications for specific aircraft models. If those highly specific experts do not exist in the local labor pool, the airline must consider hiring professionals from elsewhere – potentially international – who already possess the required skills and hold the relevant licenses.

How could global labor mobility be enhanced?

Labor mobility in aviation remains constrained by fragmented licensing frameworks and the requirement for license conversions between jurisdictions. Licenses issued in one country are not automatically recognized in another; instead, professionals often need to undergo conversion processes, additional exams, or validation procedures. These inefficiencies carry significant economic costs. The need for duplicate training, repeated certification, and lengthy conversion processes increases the cost of workforce deployment and creates delays in filling critical roles, ultimately affecting airlines' operational efficiency.

A potential solution lies in expanding the existing framework of Mutual Recognition Agreements (MRAs). MRAs are bilateral or multilateral instruments established between governments or competent national authorities. While their legal status and scope vary, participating authorities agree to accept one another's conformity assessments, testing, or regulatory certifications. In the context of aviation licensing, these instruments facilitate the mutual recognition or simplified conversion of qualifications, thereby enhancing professional mobility while maintaining equivalent safety standards. MRAs can play an effective role in bridging national regulatory systems in aviation by enabling professionals to have their qualifications recognized across borders in a straightforward and efficient manner. MRAs can minimize regulatory duplication and enhance labor mobility through several mechanisms.

- **Reducing redundant training and costs** – the recognition of equivalent safety and competency levels across jurisdictions can eliminate the need for costly and time-consuming duplicate learning.
- **Addressing regional labor shortages** – MRAs can directly reduce barriers to international labor mobility, allowing the industry to respond rapidly to peak seasons or regional developments, before shortages impact air transport services and passengers.

³⁷ (Welsh, 2025).

- **Simplifying global career pathways** – for specialized roles, such as aircraft engineers, an internationally recognized qualification can create a “global passport”, opening opportunities worldwide.
- **Digitalization and verification** – the implementation of technological solutions can further streamline validation processes, reducing administrative delays and verification concerns. Initiatives under the ICAO Electronic Personnel Licensing (EPL) provide an example.

Initiatives to reduce fragmentation in licensing requirements

While MRAs provide a mechanism to mitigate regulatory fragmentation, their adoption varies significantly by region and legal tradition. The following examples - focusing on regional efforts in Europe, Asia, the regulatory posture of the U.S., and dedicated bilateral agreements - illustrate how states structure mutual recognition and license validation in practice.

Regional regulatory integration model

Europe

Initiatives to harmonize regulatory standards in Europe began in the 1970s with the establishment of the Joint Airworthiness Authorities (JAA). The JAA was created as a cooperative body of European national authorities with the objective of harmonizing certification standards for large aircraft and engines. As the need grew for a stronger and legally binding European-level authority, the European Union Aviation Safety Agency (EASA) was established in 2002 to develop technical regulations and support the enforcement of common standards for aviation safety and environmental protection across Europe.

The resulting EU (EASA members) system represents a regional regulatory integration model that goes well beyond a conventional MRA. Rather than relying primarily on reciprocal recognition between domestic licensing systems, mutual recognition within Europe derives from a supranational legal architecture governed by common EU regulations.

At the international level, this approach is reflected in ICAO Annex 1, Standard 1.2.2.3 “*Rendering a licence valid pursuant to a formal agreement between Contracting States under common licensing regulations*”.

Other initiatives

Asia

More recently, Asia has commenced the development of MRA on Flight Crew Licensing (MRA-FCL). The Association of Southeast Asian Nations (ASEAN) actively pursues the mutual recognition of aviation licenses and certifications as part of its ASEAN Single Aviation Market (ASAM) initiative, which aims to improve regulatory efficiency and ease personnel mobility. Cooperation efforts regarding safety, air traffic management, and the strengthening of mutual recognition of certifications and licenses have also been developed, including under the ASEAN-EU Comprehensive Air Transport Agreement – AE CATA.^{38, 39}

United States

Although the United States does not automatically accept all foreign licenses, it has developed bilateral agreements that provide a model for cooperation. The U.S. has become a leader in establishing bilateral frameworks that bypass the lack of universal license recognition. Initiatives include bilateral arrangements with nations including Canada and Brazil (see below). Additionally, the U.S. is modernizing 14 CFR Part 43 to better address maintenance personnel requirements. Looking forward, the Department of Transportation’s new Advanced Air Mobility (AAM) National Strategy, positions the federal government to lead the global development and certification of AAM technologies, reinforcing the U.S. market’s influential role.

³⁸ (ASEAN, 2018). During the latest 49th ASEAN Airlines Meeting, the MRA on FCL was ratified by 8 ASEAN member states. Technical elements included the ratification of already adopted initiatives such as Qualification of Flight Simulation Training Devices (FSTD), Aviation Training Organisations (ATO), Safety Oversight of National Aviation Administration (NAA), and the development of conversion of flight crew licenses (Commercial Pilot License CPL, Airline Transport Pilot License ATPL, and Multi-Crew Pilot License MPL). The Terms of Reference for the Implementation Management Committee (IMC) under MRA on FCL was endorsed by the 52nd ATWG/60th STOM.

³⁹ (Khee-Jin TAN, 2013).

Bilateral agreements

Other key instruments include the EU's Bilateral Aviation Safety Agreements (BASAs) - binding treaties concluded between the EU (supported technically by EASA) and third states such as the United States, Canada, Brazil, China, and Japan. BASAs are principally aviation-safety regulatory cooperation agreements, often covering airworthiness, environmental certification, and maintenance. Their scope depends on relevant annexes and implementation procedures. In some cases, they also contain provisions that facilitate the recognition of personnel licences and support labor mobility.

Bilateral ambitions and bureaucratic barriers

Although BASAs are designed to foster international regulatory cooperation, they rarely achieve full reciprocity and often preserve notable operational frictions. The practical limitations of mutual recognition become particularly evident when converting third-country professional qualifications into the European framework. Converting a non-EASA professional flight crew license (such as CAA Norway, UK CAA) into an EASA Part-FCL license remains a big regulatory hurdle rather than a streamlined transition. Despite the high-level agreements, candidates must typically pass all 14 EASA theoretical exams and a skill test under Part-FCL regulations. These requirements reflect the limited mutual recognition between ICAO licensing systems, as EASA conversion rules typically require full compliance with Part-FCL standards rather than automatic credit transfer.⁴⁰

A parallel dynamic governs aircraft maintenance personnel. While an EASA Part-66 Aircraft Maintenance License (AML) is globally renowned and often valued by foreign carriers as evidence of rigorous training, this commercial prestige must not be conflated with regulatory certification privileges. Consequently, cross-border labor mobility remains constrained: maintenance engineers must undergo formal conversion procedures - typically requiring bridging examinations on domestic legislation - even when bilateral agreements exist to facilitate the process. This highlights the distinction between employability and regulatory certification. Even where employers recognize maintenance professionals as highly qualified and suitable for employment, they must still obtain the relevant regulatory certification before they can exercise the privileges of their profession.

⁴⁰ (Aeroscout, 2026).

Table **3** compares the operational differences between independent national oversight and MRA implementation. While maintaining separate regulatory systems ensures direct sovereignty, it frequently creates administrative redundancies and limits the movement of specialized personnel. MRA are designed to address these challenges by aligning standards and facilitating a shared oversight framework. This comparison highlights the impact of both approaches on certification timelines, resource allocation, and the logistical mobility of the global aviation workforce.

Table 3: Summary benefits of MRAs – a qualitative review

Feature	Without Mutual Recognition	With Mutual Recognition
Conversion Time	Months to Years: Extensive bridge training and redundant check-rides	Days to Weeks: Simple administrative validation and "difference" training.
Conversion Cost	Prohibitive: High costs for flight hours, medicals, and full exam suites.	Minimal: Limited to processing fees and basic verification.
Workforce Utilization	Static: Pilots and engineers (for example) are "locked" into their local regulatory circumstances.	Dynamic: Global talent can be deployed rapidly to meet seasonal or regional demand, or longer-term structural considerations.
Safety Oversight	Heavy: Significant paperwork trails for every single part, person, or aircraft move.	Lean: Digital "trust" frameworks allow for automated or fast-track approvals.
Market Resilience	Fragile: A local strike or shortage can ground an entire national fleet.	Robust: Shortages are mitigated by the ability to "lease" certified crew and tech globally.
Innovation Adoption	Lagging: New tech must pass multiple separate hurdles to be adopted worldwide.	Accelerated: A single certification "anchor" allows for more rapid global deployment.
Supply Chain Flow	Friction-Heavy: Parts can be stuck in "quarantine" awaiting local certification.	Fluid: Parts with a recognized Release Certificate move through customs processes immediately.

Source: IATA Sustainability and Economics.

Are there other potential mobility solutions?

While MRAs can be a useful framework to reduce the friction of cross-border labor mobility, they do not represent the entire solution. The transition toward more holistic "supply-side workforce solutions" over the medium-to-longer term represents the next step in aviation workforce management. This long-term strategy requires the coordination of both industry participants and regulatory authorities, at a global, regional and national level. A broader strategy should focus on key areas:

- **Training and education programs:** The financial costs of aviation licensing and education for a number of the main occupations, including flight crew and ATCOs, are very high and can act as an important entry barrier. Making training more available and more accessible will contribute to directly increasing the supply of labor available for the industry by allowing capable candidates to more readily enter the profession and help to prevent generalized employment shortages.
- **Standardized global curricula:** Moving beyond mere recognition of comparable standards, the industry should advocate for the greater alignment of training curricula. Establishing a single, consistent syllabus for aviation professionals worldwide would ensure that foundational knowledge is uniform, effectively removing the need for redundant testing when personnel move across borders.
- **Targeted bridging programs:** Instead of requiring experienced professionals to repeat their entire training when moving to a new country, regulatory bodies should strengthen efforts to develop specialized bridging courses. These programs could focus exclusively on key legal and operational differences between jurisdictions, enabling the efficient and safe integration of international talent into local markets.

- **International exchange initiatives:** Developing collaborative training partnerships between major airlines and maintenance providers would help to generate a workforce that is more capable of operating under multiple sets of national rules. By training across different systems from the start of their careers, these professionals would gain the versatility required to work effectively in various global markets.
- **Incentivized mobility:** To address critical regional shortages, governments and industry bodies could offer career incentives and/or financial support for required certifications for key occupations, such as flight crew, AMPs or ATCOs, encouraging qualified professionals to relocate to where they are most needed.

By prioritizing these workforce expansion initiatives, the aviation sector can move from a reactive approach – struggling to verify a limited number of available workers – to a more proactive and holistic strategy. Over time, this shift would build a more resilient, mobile, and highly skilled global workforce capable of meeting the industry's future needs.

Conclusion

The anticipated growth in air passenger demand, combined with global demographic trends, means that skill shortages in the aviation sector are likely to become more pressing issues in the years ahead. Increasing labor mobility could be one avenue by which the aviation labor market could become more flexible and able to respond to global shifts in supply and demand. Despite the existence of an overarching global framework established by ICAO, aviation licensing across key occupations remains a deeply nationalized process, curtailing labor mobility. Certifications are governed by country-specific regulations that reflect governments' common priority to maintain sovereignty, manage national security, and control over critical infrastructure. These localized requirements often take precedence over international standardization, creating barriers to the seamless recognition of professional qualifications across borders.

While this approach is understandable, given that safety is paramount in the aviation industry, there is scope for measures that improve the efficient allocation of qualified labor without compromising operational safety. Indeed, such measures could strengthen safety outcomes by ensuring a larger pool of appropriately skilled personnel is available to meet operational needs. Looking ahead, the combination of rising air passenger demand and unfavorable global demographic trends is likely to intensify workforce pressures, making skills shortages and constraints on labor mobility increasingly significant challenges if left unaddressed.

Further developing mutual recognition should be explored as part of potential solutions. All solutions must involve greater global harmonization, targeted transition paths, and incentivized mobility, without which labor shortages are likely to place more binding constraints on the aviation industry as demand for its services continues to grow.

Appendix 1: Regulatory requirements in other industries

Here we highlight both the common principles underlying professional regulation and the distinct ways in which they are applied across selected sectors.

Table 4: Similarities and differences in licensing – aviation versus other selected industries

INDUSTRY	PRIMARY LICENSED PROFESSIONS	SIMILARITIES to aviation	DIFFERENCES to aviation
Healthcare	Physicians, nurses, pharmacists, and specialized therapists.	- Requires formal education and training. - Rigorous examinations and licensing certify demonstrated minimum standards of competence and knowledge. - Similar safety focus, need for ongoing training etc.	- Unlike aviation, medical licensure is typically State-governed, creating the likelihood of a lack of harmonization. - Healthcare lacks a globally accepted standardization framework, making cross-border movement more complex (WHO).
Construction	Licensed contractors, architects, electricians, and plumbers.	- Licensing is common for contractors, but general laborers often only require site-specific safety certifications rather than professional licenses. - Construction professionals (civil engineers, site managers, or electricians) are regulated – although this is often at national/ regional/state levels, with requirements tied to local building codes, safety standards, and legal frameworks.	- Typically, licensing must comply with country-specific regulations, zoning laws, and certification bodies, which can vary significantly and are rarely harmonized internationally. - In some countries, many construction-related professions are not governed by a unified national state license, instead by professional associations (e.g. the Swiss Society of Engineers and Architects (SIA)) and provincial licenses (Canada's construction system).
Logistics/ Land Transport	Commercial Driver's License (CDL) holders.	Licensing is typically required for operators (drivers), but rarely required for ground staff, warehouse workers, or dispatchers.	- Generally regulated by national or industry standards, but no international licensing system. - For example, a CDL is typically invalid when a border is crossed, in the absence of a bilateral framework or other arrangement. An aviation license holds intrinsic global validation via ICAO Article 33. - Combination of industry-based, private certifications, national regulations (e.g., International Federation of Freight Forwarders Association – FIATA).
General Corporate	Accountants (Certified Public Accountants - CPA), a collective body of licensed lawyers (BAR). The International Education Standards (IFAC) set out the principles that professional	- Require formal education, training. - Rigorous examinations and licensing certifies demonstrated minimum standards of competence and knowledge (e.g., Pilots: ATPL,	- CPA and BAR do not provide global licensing standards, each country/ province/ state can have its own. - While in aviation, pilots can often validate or convert their licenses, CPA and BAR

accountancy organizations should follow to build a national accountancy profession.

Also, for accountants, the [International Financial Reporting Standards \(IFRS\)](#) constitute a global accounting language that companies are required to use when reporting.

- Accountants: CPA exam, Lawyers: Bar exam). They require continuing professional development (aviation: recurrent training, simulator checks; accountants, mandatory continuing professional development to maintain knowledge of tax laws, statutes, case laws, ethics, etc.)

- licenses are not portable. Accountants and lawyers must re-qualify or pass additional exams in new jurisdictions. Consequences in case of unlicensed practice differ. Aviation professionals face severe risk with criminal, civil, and regulatory penalties. CPA and BAR face civil, legal and professional penalties. Usually, unlicensed practice is prohibited.

Source: IATA Economics & Sustainability.

References

- Aeroscout. (2026). *How to Convert a Pilot Licence to Another Country in 2026. FAA, EASA, UKCAA and Transport Canada routes, split by license level*. Retrieved from <https://www.aeroscout.net/blog/convert-pilot-licence-another-country>
- Aquilina, S. (2024). Enhancing the Enforcement Powers of ICAO in Aviation Safety and Security. *Teisé aktualijos / Problems of law*, 133, 118-129. Retrieved from <https://www.zurnalai.vu.lt/teise/en/article/view/37612/36119>
- ASEAN. (2018). *Asean Mutual Recognition Arrangement on Flight Crew Licensing*. Retrieved from <https://agreement.asean.org/media/download/20180223163247.pdf>
- Bae, K., & Timmons, E. (2023, March 8). Now You Can Take It with You: Effects of Occupational Credential Recognition on Labor Market Outcomes. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4389898
- Bloomberg. (2016, 08 17). *Chinese Airlines Wave Wads of Cash to Lure Foreign Pilots*. Retrieved from <https://www.bloomberg.com/news/articles/2016-08-17/chinese-airlines-lure-expat-pilots-with-lucrative-pay-perks>
- BLS. (2025, May). *Economic News Release OEWS OEWS Program Links PRINT:Print*. Retrieved from Table 1. National employment and wage data from the Occupational Employment and Wage Statistics survey by occupation, May 2025: https://www.bls.gov/news.release/ocwage.t01.htm?mod=article_inline&utm_source=chatgpt.com
- Boeing. (2026). *Pilot and Technician Outlook 2026-2045*. Retrieved from <https://www.boeing.com/content/dam/boeing/v2/products/pilot-technician-outlook/pdf/2026-ptodownload.pdf>
- BTS. (2026, February 10). *U.S. Cargo and Passenger Airlines Lost 27,659 Jobs in December 2025*. Retrieved from <https://www.bts.gov/newsroom/us-cargo-and-passenger-airlines-lost-27659-jobs-december-2025>
- Byers, D. (2016, July-August). The Aviation Workforce of Tomorrow. Where Are They Needed - And Where Will They Come From? *TR News*(304). Retrieved from <https://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf>
- CAE. (2025). *Aviation Talent Forecast*. Retrieved from <https://www.cae.com/2025-aviation-talent-forecast/#start>
- Cela, Z. (2020, August 20). *Labor Mobility Can Assist Employing Sectors with Addressing Growing Labor Scarcity*. LaMP, Labor Mobility Partnerships. Retrieved from https://lampforum.org/wp-content/uploads/2020/08/lamp-note_employers_designed_clean.pdf
- Cui, Y., Ma, L., Ding, Q., He, X., Xiao, F., & Cheng, B. (2024, July 18). Aircraft turnaround time dynamic prediction based on Time Transition Petri Net. *PLOS one*. doi:<https://doi.org/10.1371/journal.pone.0305237>
- EASA. (2019, 03 20). *Licensing for General Aviation*. Retrieved from Licensing for GA Pilots and Mechanics: <https://www.easa.europa.eu/en/domains/general-aviation/licensing-general-aviation>
- ENIC-NARIC. (2026, 09 03). *Non-regulated professions*. Retrieved from <https://www.enic-naric.net/page-non-regulated-professions>
- Ferrara, R. (2013). Air traffic control. EBSCO.
- Gittleman, M., Klee, M., & Kleiner, M. (2018). Analyzing the Labor Market Outcomes of Occupational Licensing. *Industrial Relations*, 57(1).
- Hartley, J., & Kleiner, M. (2026, July 20). Analyzing Occupational Licensing Across Nations. *NBER*, 32. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=7063366
- Harvey, J.-F. (2022). *The American Visa Program Targeted at Overseas Pilots*. Retrieved from Global Law Experts: <https://globallawexperts.com/the-american-visa-program-targeted-at-overseas-pilots/#:~:text=The%20American%20visa%20program%20for,shortage%20in%20the%20United%20States.>
- IATA S&E. (2026). *IATA Long-Term Air Transport Passenger Demand Projections*. IATA.
- ICAO. (2022). *Agenda Item 24: Technical Assistance Programme: Harmonization of the Latin American Aviation Regulations (LAR)*. Retrieved from https://www.icao.int/sites/default/files/Meetings/a41/Documents/WP/wp_310_en.pdf#:~:text=2.6

%20The%20SRVSOP%20States%20that%20have%20adopted,CATCs%20or%20the%20automa
tic%20validation%20of%20licences.

- ICAO. (2024). *Next generation of aviation professionals*. Retrieved from [https://www.icao.int/sites/default/files/secretariat/CapacityDevelopmentImplementation/ngap/Documents/Final%20NGAP%20strategy%20with%20design%20\(1\).pdf](https://www.icao.int/sites/default/files/secretariat/CapacityDevelopmentImplementation/ngap/Documents/Final%20NGAP%20strategy%20with%20design%20(1).pdf)
- ICAO. (n.d.). *Language proficiency*. Retrieved from <https://www.icao.int/operational-safety/language-proficiency>
- Johnson, J., & Kleiner, M. (2020). Is Occupational Licensing a Barrier to Interstate Migration? *American Economic Journal: Economic Policy*, 12(3), 347-373. Retrieved from <https://www.aeaweb.org/articles?id=10.1257/pol.20170704>
- Khee-Jin TAN, A. (2013). Toward a Single Aviation Market in ASEAN: Regulatory Reform Industry CHallenges. *IRIA Discussion Paper Series*. Retrieved from <https://www.eria.org/ERIA-DP-2013-22.pdf>
- Kleiner, M. (2000). Occupational Licensing. *Journal of Economic Perspectives*, 14(4), 1989-202. Retrieved from <https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.14.4.189>
- Kleiner, M., & Kudrle, R. (2000). Does regulation affect economic outcomes? The case of dentistry. *The Journal of Law & Economics*, 547-582. Retrieved from <https://www.jstor.org/stable/10.1086/467465>
- Kleiner, M., & Todd, R. M. (2009). Mortgage Broker Regulations that Matter: Analyzing Earnings, Employment, and Outcomes for Consumers. In D. H. Autor, *Studies of Labor Market Intermediation* (pp. 183-232). Retrieved from Chicago Scholarship Online
- Kleiner, M., & Xu, M. (2025, June 2). Occupational Licensing and Labor Market Fluidity. *Journal fo Labor Economics*, 43(3). doi:<https://doi.org/10.1086/730120>
- Koumenta, M., & Pagliero, M. (2019, December). Occupational Regulation in the European Union: Coverage and Wage Effects. *British Journal of Industrial Relations*, 57(4), 818-849. doi:<http://doi.org/10.1111/bjir.12441>
- Morris, K., & Krueger, A. (2013). Analyzing the Extent and Influence of Occupational Licensing on the Labor Market. *Journal of Labor Economics*, 31(S1), 173-202. Retrieved from <https://ideas.repec.org/a/ucpl/jlabec/doi10.1086-669060.html>
- National Governors Association. (2022). Levels of Occupational Regulation. doi:<https://www.nga.org/wp-content/uploads/2022/10/Levels-of-Occupational-Regulation.pdf>
- O'Connell, J. (2011). The rise of the Arabian Gulf carriers: An insight into the business model of Emirates Airline. *Journal of Air Transport Management*, 17(6), 339-346. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0969699711000160>
- OECD. (2024). *Competition and Regulation in Professions and Occupations*. OECD Roundtables on Competition Policy Papers. Retrieved from https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/05/competition-and-regulation-in-professions-and-occupations_a35fd2e6/218869f5-en.pdf
- Searif-Sari.org. (n.d.). *Aviation regulatory cooperation - Everything you need to know about global aviation standards*. Retrieved from <https://searif-sari.org/>
- Simillon, P. (2017, January 16). *Top ten common causes of airline disruptions*. Retrieved from AMDEUS: <https://amadeus.com/en/blog/articles/top-ten-common-causes-airline-disruptions>
- Vertas Management. (2015, November 23). *Pack your bags – the Middle East is calling for aviation expats to fill the gaps*. Retrieved from <https://www.vertas.com/news/pack-your-bags-the-middle-east-is-calling-for-aviation-expats-to-fill-the-gaps/>
- Welsh, J. (2025, August 12). *Demand for airline pilot 'normalizes': Post-pandemic surge abates*. Retrieved from AOPA: <https://www.aopa.org/news-and-media/all-news/2025/august/12/demand-for-airline-pilots-normalizes>