THE FUTURE OF AIRPORT WORKFORCE

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EXECUTIVE SUMMARY

People play a central and important role in the success of any company, and an airport is no different. This research will discuss the importance of airport leading workforce planning for its stakeholders, focusing on how diversity, equity, and inclusion matter in the workforce. The future of airport workforce will be examined in terms of trends impacting workforce, the current situation of airport workforce and its challenges. Recommendations and opportunities on collaborative approaches between airports and the needed key skills to manage the future airport industry will be explored.

Airports leading workforce planning by increasing investment in talent, encouraging workforce development and engaging stakeholders from early stages will furnish endless benefits ranging from developing skills, attracting, and retaining talents, improving productivity, to reducing labor cost in terms of flexibility and workforce deployment.

The growing concerns over environmental sustainability and social responsibility coupled with workforce evolving needs and the presence of multigenerational workforce are some of many factors redefining the workforce. In addition to the advancement of technology which raised expectations of passenger experience and airport operations.
The most notable trend impacting the workforce is embracing flexibility and remote work models. Creating a balanced blend of both remote and on-site work at airports while giving importance to the values and cultures of the organization can present great career opportunities for employees and a distinctive approach for a result-oriented management.

Emphasizing diversity, equity, and inclusion in the workforce by building a nurturing and balanced workplace environment for employees that promotes representation and involvement of various and wide-ranging individuals, in all the ways people are different, is considered the key to drive growth and progress.

Airports are facing several increased workforce challenges. The "Great Resignation" and loss of experienced personnel led to extended knowledge and skill gaps within airport workforce and triggered sharp shortage of skilled trades workers, labor, and talent.
The pandemic highlighted employee frustration with current work conditions and gaps in social and environmental responsibility practices.

Moreover, airports workforces are having hard time adopting and committing to new technologies due to the accelerated pace of technological advancements and inadequate personnel support. Nevertheless, opportunities can rise from these challenges to redesign airport jobs and offer more value for airports and their workforces.

Identifying, assessing, and analyzing risks impacting airport workforce is crucial to create awareness and mitigate these risks. Health risks from prolonged exposure to harmful emissions and noise, in addition to direct contact from passengers can be mitigated by complying with health culture and providing proper protective equipment. Work conditions risks such as Injuries and fatigues caused from work overload and shortage in workforce can be alleviated by rethinking recruiting & training practices and employing technology to serve the workforce. Major risks of exclusion inequality & discrimination need to be eradicated from work environment by strengthening policies & procedures related to DE&I and enforcing strict disciplinary actions. Safety and security posed by conflicts, terrorism and clashes with travelers; due geopolitical instabilities and violent passengers, can be mitigated by utilizing technology and artificial intelligence (AI) to identify and monitor threats.

As collaboration is fundamental to aviation business success, regional and international airports can collaborate in a collective manner to address the future of airport workforce by:

o Expanding regional and international staff exchange programs.
o Creating a shared online platform (E-library) and associated mobile application.
o Collaborating to expand airport colleges presence in Asia Pacific region.

Potential solutions and recommendations to overcome airport workforce challenges and build brighter future can be explored such as:

o Encourage airports and stakeholders to improve employee proposition, experience, and work environment, focusing on social responsibility, diversity, equity and inclusion.
o Collaborate with technical and educational institutes to communicate airport talent and skilled worker's needs.
o Bridge the generational gaps within the airport workforce through adequate and periodic trainings.
o Increase investment in talents, reskill and upskill workforce to reduce workforce skill gaps.

The main goal is to prepare airport workforce to navigate through future challenges in a safe and efficient manner by creating an agile and resilient workforce in a diverse, sustainable and equitable work environment.

Introduction

In an industry that is rapidly changing with soaring demand and vast expansion potentials since almost 20 years, Covid-19 hit. Aviation industry, primarily airports, are facing numerous challenges due to their unique environment and strict safety precautions and measures.

It is inevitable that the consequences of the pandemic on economic activity, employment, and global labor market were stark. However, airports were one of most severely affected sectors. More than 610 million cases of Covid-19 have been confirmed worldwide [1], which led countries to impose domestics and international travel ban among many other restrictions. This in return resulted in more than 20 airlines suspending their operations by 100 percent as of March 2020. By December 2020, 15 million flights were cancelled globally due to coronavirus outbreak, which left the aviation industry in massive recession [2].

| More than 20 airlines suspended | 50,000 flights cancelled per day | 15 million flights cancelled globally |

Figure 1: Effects of Covid-19

COVID-19 changed the airports labor market and workplace in significant and unexpected aspects. Airport staff were required to operate and maintain safe and secure transport in unforeseen circumstances, with unpredicted demand and harsh safety measures. Airport will have to manage uncertain and quickly developing future filled with challenges and opportunities. Challenges such as competition on talent from other industries and rising workforce demands will impact how, where and when the work will be conducted. The deployment of technology, digital solutions, and tools will affect the decision-making process, redesign airport roles, facilitate various jobs and improve the learning practices.

Investing in the Workforce of the Future

"Employers who recognize the importance of investing in their workforce have a more productive workforce, a more efficient workforce, a more loyal workforce, less turnover, and, in the private sector, more profitable" Valerie Jarrett- Former Senior Advisor to the President of the United States

Airports Leading Workforce Planning

Several industries were left facing relatively significant challenges in workforce management following the pandemic. Airports, while working to ensure operations and strategic planning are always managed effectively, should focus on improving passenger experience and managing talent in such a competitive and fierce talent market.
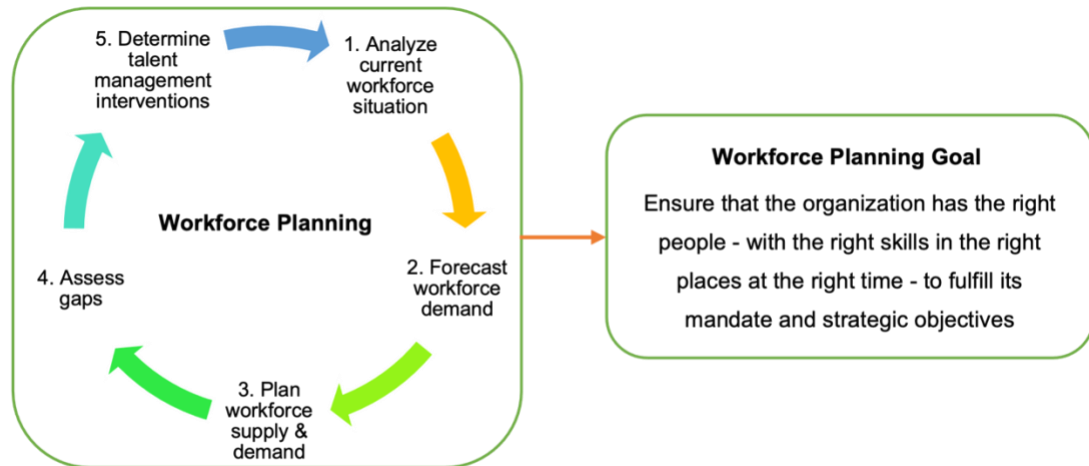
Figure 2: Workforce planning

Workforce management is not just an airport challenge, every airport business partner from airlines, cargo companies, to concessionaires need to address these challenges in a collaborative manner to meet the demand and achieve their business goals.

Airports in cooperation with their stakeholders behoove to lead workforce planning by utilizing innovative solutions and advanced technologies to create opportunities, overcome labor challenges and achieve strategic objectives. Major part of workforce planning concentrates around adopting strategies of attracting, engaging, equipping, and sustaining workers to fulfill business needs. The need to focus on broadening skills, expertise, ability, and adaptability of current employees and promising leaders is crucial for building brighter airport workforce future [3].
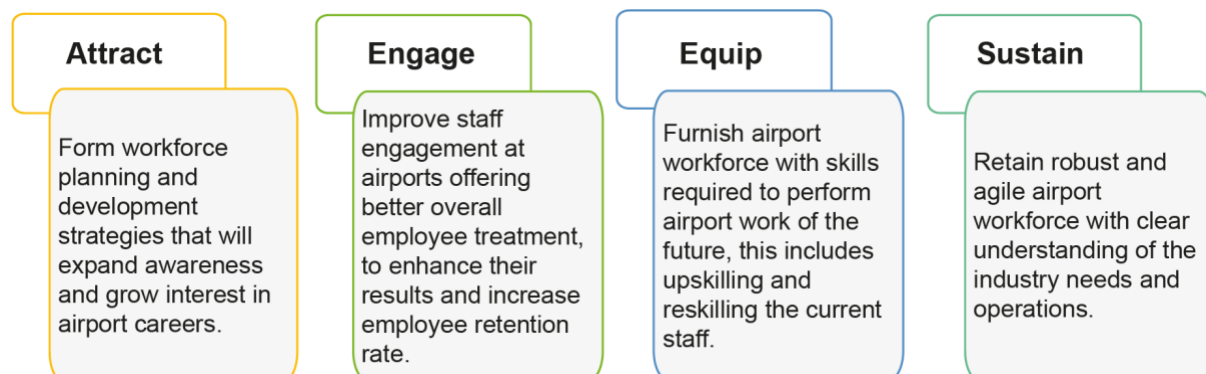
Figure 3: Airport workforce planning & development strategies

The Importance of Airports Leading Workforce Planning for their Stakeholders

Airports Enhancing Stakeholders Engagement

Enhancing the engagement of stakeholders within the airport ecosystem is vital to appropriately utilize all available resources, facilitate processes, and enable proper communication and coordination with all business partners.

Communicate Specific Industry Needs in a Collaborative Manner

Airports working jointly with their stakeholders through partnering with governments and organizations to communicate specific industry needs is necessary to attract qualified personnel. Conducting career fairs and remodeling educational curriculum to introduce students to the aviation industry, its activities and benefits. This will broaden their knowledge and ensure employment ready graduates to progressively grow and accelerate the aviation industry.

Improve Workplace Well-Being and Employee Health and Safety

Committing to the health and safety culture within airport ecosystem, providing more awareness and understanding towards employee physical and emotional well-being as well as stress management will yield a healthy and productive staff. Furthermore, identifying means to evaluate employee engagement to revamp work will establish meaningful and enriching job opportunity, improve employee perception of the job, and build a connection between the job and airport mission [4].

Leverage Training: Upskill and Reskill Airport Workforce

Equipping airport workforce with the necessary skills will highly contribute to the capacity development within the current and future workforce. Recognizing development prospects in education, training, and experience is important to provide promising career opportunities by collaborating with educational institutes, governments, and even other airports. Major part of preparing workers for the future is upskilling and reskilling the current workforce. Upskilling staff by strengthening their knowledge through learning skills directly related to their current work or their projected career paths. Reskilling staff by re-educating and re-training employees to new roles withing the airport.

According to the Airport Cooperative Research Program [5], an airport can spend up to 150% of the individual leaving salary to replace them. This refers to the importance of retaining robust and agile workforce with strong understanding of the industry needs. Furthermore, Airports should develop strategic succession plans for critical posts to maintain seamless flow of operations.

Share Results Related to Workforce Planning with Stakeholders

For enhanced workforce planning, airports should include stakeholders and share results from identifying and analyzing risks related to airport workforce. Planning, defining the causes and mitigation measures, monitoring activities and risk areas, and collecting data such as occurrences, incidents and accidents are crucial for better outcomes.

Influence Shared Decision-Making Practices

Influencing the collaborative decision-making concepts across airport stakeholders by enabling the exchange of valuable information and identifying critical workforce issues will significantly serve the prosperity and development of airport workforce.

Benefits of Airport Leading Workforce Planning

After all, strategies aiming to lower turnover of quality employees and encourage positive work culture will reduce hassle and cost, considerably providing better experience for employees and customers.

Airports optimizing workforce management and engaging individuals from all stakeholder groups will create quality and productivity advantages. Table (1) illustrates some of the most important stakeholder groups and the advantages of airport leading workforce planning for each stakeholder group [6].

Table 1: Advantages of airport leading workforce planning

Stakeholder Group	Advantages of Airport Leading Workforce for Stakeholder Group
Passengers	Increased efficiency for passengers' movement in terms of time and accessibility
	Better customer service quality and increased customer satisfaction
Concessionaires	Improved quality of service and higher profit margins
Airport Employees	Secure job with better income and benefits
	Promising career path development
	Skilled and well-trained individuals capable to overcome challenges
Local Government	Maximized economic impact
	Expanded routes and destinations
	Minimized carbon footprint and harmful emissions
Air carriers	Optimized operations in term of cost and punctuality
	More safe and secure operations
Airport Suppliers	Increase visibility of Airport Supply Chain to achieve better lead time and services
	Establish better supplier relationship to streamline and improve processes
Communities affected by airport operations	More job opportunities for local community increase quality of life
	Better learning and development opportunities

Trends Impacting Airport Workforce

Following COVID-19 pandemic, airports recognized the importance to cope and adapt with transformational business shifts in workforce, highlighting the accelerated pace of change due to the pandemic. It is vital to identify trends that will reshape the future of airports workforce to evaluate and rethink the needed skills, recommendations and opportunities for airport workforce [7].

TREND: Technology Transformation and Advancements

The role of technology, innovation and data driven systems is becoming more valuable and essential in airport business. Artificial intelligence, robotics, and automation as well as cyber security proved to be important tools able to pose significant impacts on the advancement of airports workforce. The rampant technology advancement and current drastic alterations characterized as the fourth industrial revolution raised expectations and standards of airport operations, customer service and commercial opportunities to a new level.

The rapid deployment of advanced technologies and automated systems at airports will ultimately lead to a significant mismatch or shortfall in skilled workforce capable of performing their assigned tasks and future jobs. Nevertheless, proper training on utilizing technology will better serve the workforce in alignment with sustainable development goals (SDGs).

Data-driven decisions and automated processes such as baggage handling systems and terminal monitoring will optimize the workflow and increase productivity. This will result in employees being the center of technology development and will allow them to focus on inherently human activities [8].
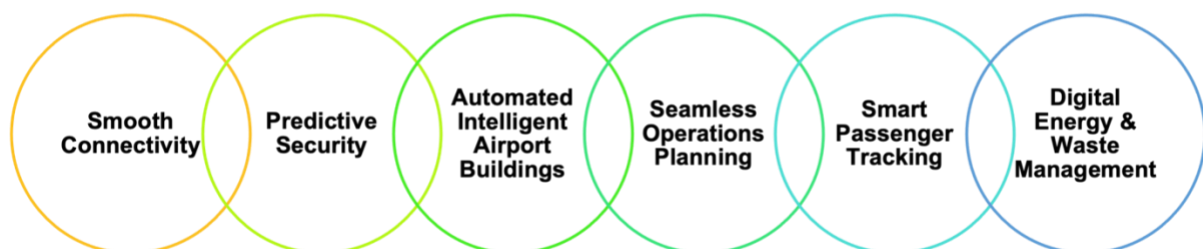

Figure 4:Digital transformation applications

TREND: Social Responsibility and Environmental Sustainability

Stakeholders believe airports should have more contribution towards local communities and the environment. Leveraging the organization resources and embracing policies aligned with the sustainable development goals to better the world will improve local communities, engage employees, and boost their moral. This in return will attract talent, increase quality employee retention and loyalty, enhance productivity, and create the sense of fulfillment that will eventually lead to positive influence on the organization bottom line results.

Addressing environmental sustainability and climate change is critical for the future of airport workforce. The rising concerns over protecting the environment and reducing carbon footprint by younger generations is legit. Promoting sustainable and environmentally friendly workplace will influence the career decisions for talents positively and increase employee engagement and innovation.

The organization commitment to corporate social responsibility CSR and environmental sustainability, along with workforce engagement and green behaviors will ultimately achieve positive outcomes for the employees, the organization, and the world [9].

QUEEN ALIA INTERNATIONAL AIRPORT (QAIA) IS TRENDING

Environmental Impact of Queen Alia International Airport (QAIA)

In 2022, following thorough and studied approaches to align with the global climate goals to reach a net-zero carbon status by 2050, Airport International Group announced that QAIA has become the first in the Middle East, the second in the ACI Asia-Pacific region and one of only 21 airports worldwide to achieve Level 4+ "Transition" of the Airport Carbon Accreditation Programme.

Corporate Social Responsibility CSR: Airport International Group Foundation (AIGF)

AIGF was established in 2019 and officially launched in 2021 to serve as the executive arm of Airport International Group`s philanthropic activities. AIGF operates within three key areas supporting the UN sustainable development goals (SDGs) which are Youth Empowerment, Underprivileged Community Development and Environment. Among its many activities, AIGF has rehabilitated "My Craft" training center and successfully trained 112 young men and women on vocational training.

Figure 5: QAIA is trending

TREND: Demographic Variations

Thanks to developed health system and technology advancement, life expectancy improved significantly. For the first time ever, five generations with different values, behaviors and perspectives comprise the current global workforce. According to insights from the United Nations and International Labor Organization, Millennials represent the lion's share of current workforce [10]. Furthermore, Millennials and Gen Z who are fluent and comfortable with technology, diverse and change advocates will represent half of the workforce by 2025 [11].

Airport challenges posed by this demographic change varies from the need to create balanced and harmonized work environment that can contain these generational groups, navigating the extremely competitive job market in search for quality talents to providing more job flexibility. In addition to highlighting diversity, transparency, fairness, and culture within the organization.

Traditionalists	Baby Boomers	Generation X	Millennials	Generation Z
born 1928-1945	born 1946-1964	born 1965-1980	born 1981-1996	born 1997-2012
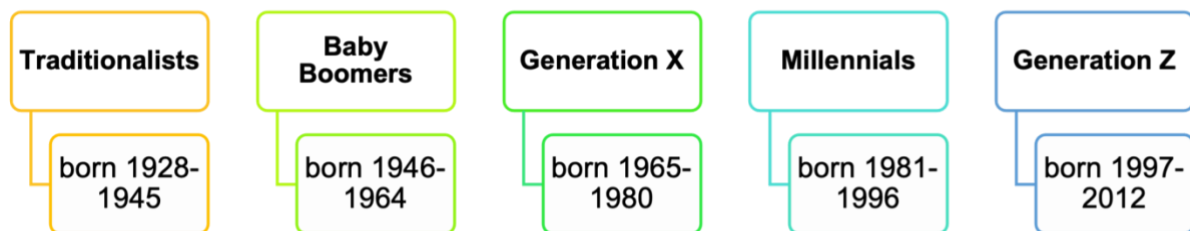
Figure 6: Age group demographics

TREND: Hybrid and Remote Work

In light of COVID-19 pandemic, the most notable trend might be the shift into hybrid or remote work. The physical location is not considered as a constraint in seeking quality and remarkable talents anymore. According to CBRE 2022 Asia Pacific Office Occupier Survey, 66% of respondents are adopting flexible working as the new normal. As Millennials and Gen Z prefer remote work, there is no "one size fits all" flexible work strategy for airports [12].

Airports need to rationalize the reasons employees need to be physically present at work. Flexibility in work should be appreciated by the employer. However, employees must acknowledge the importance of the organization values and cultures, diversity at workplace and leadership involvement. While several roles can be remotely executed, airside or ground handling workers need to be present on site. Creating a balanced blend of both remote and on-site work can present great career opportunities for employees and a distinctive approach for a result-oriented management.

For instance, Airport International Group implemented hybrid and remote working models and provided the needed tools for employees to work efficiently from home with almost 40% of participants confirming they completed 100% of their tasks, Appendix A - 1 showcases the extended results of this case study.

TREND: Workforce Evolving Needs and Expectations

COVID-19 economic and social impacts were devastating, triggering one of the worst job crises since almost 80 years [13]. Some employees were forced to leave their job because their employer was out of business or due to downsizing. Yet, the number of employees quitting their jobs have risen drastically as well. The pandemic shed light on major factors exposing employee frustration and disappointment such as the absence of career development opportunities, unrealistic performance expectations, inconsiderate leadership, low pay, lack of communication, underappreciation and burn out.

Employees productivity and performance at the job is driven by their satisfaction and well-being, therefore It is expected of employers to value and appreciate employees, support creativity and innovation. Employees need to feel engaged and included in all aspects within the organization to achieve belonging. It is imperative for employers to tackle issues such as inequality, injustice, and mental health to attract and maintain talent.

Workforces tend to overperform when their needs and expectations are met, developing strong connection and optimistic mindset. Figure (6) introduces means to realize workforce needs and guarantee organization success [14].

Employer creating stimulus to build purpose and meaning for employees' work

Creating a positive work environment that value and engage employees to improve their well-being and reduce stress and negativity.

Provide adequate training and education in addition to career development opportunities to upskill and reskill the workforce.

Acknowledge and celebrate differences, inclusiveness, and fairness to be considered as the highest priorities and fundamental values
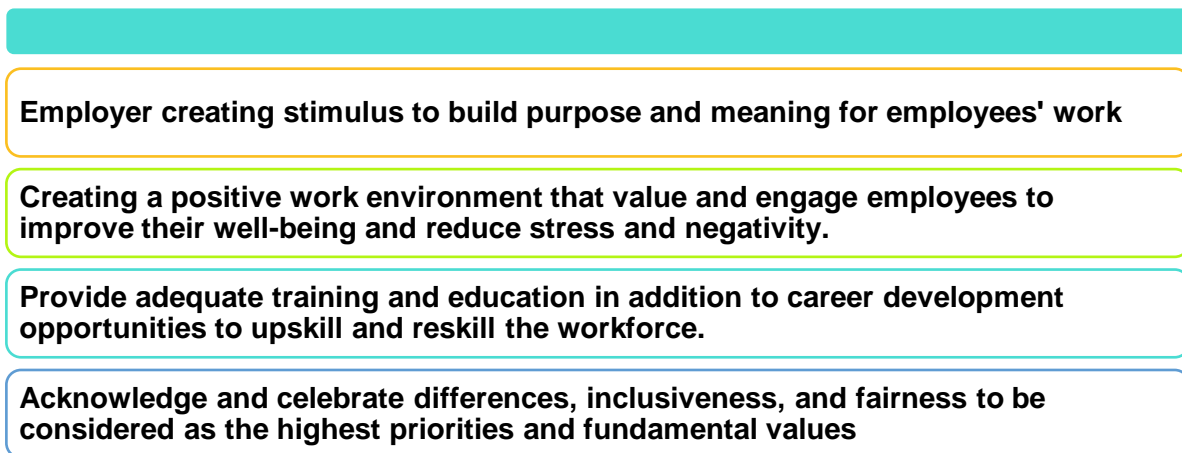
Figure 6: How to realize workforce needs

The satisfaction of employees is crucial to business continuity and flourishment, content employees will provide more innovative solutions and distinctive problem-solving approaches that will ultimately serve the business goals.

Diversity, Equity, and Inclusion (DE&I)

> **"When we listen and celebrate what is both common and different, we become wiser, more inclusive, and better as an organization."** Pat Wadors, Chief People Officer, UKG

Building a nurturing and balanced workplace environment for employees that promotes representation and involvement of various and wide-ranging individuals, in all the ways people are different, is considered the key to drive growth and progress.

Although diversity, equity and inclusion in workplace are commonly associated, each represents a different concept, Figure (7) defines these concepts [15].

Diversity

Employing individuals with wide range of different characteristics and backgrounds including gender, sexuality, socioeconomic status, experience, as well as cognitive (diversity of ideas) and cultural diversity. welcoming different perspectives to business.

Equity

Providing fair access to opportunities and advancement for all employees, taking individual needs into consideration while also realigning the organization practices and policies to ensure fair access to these opportunities.

Inclusion

Giving all employees the opportunity to contribute to the organization culture and business outcomes, ensuring employees of all voices and visions feel valued, empowered, included, and comfortable.
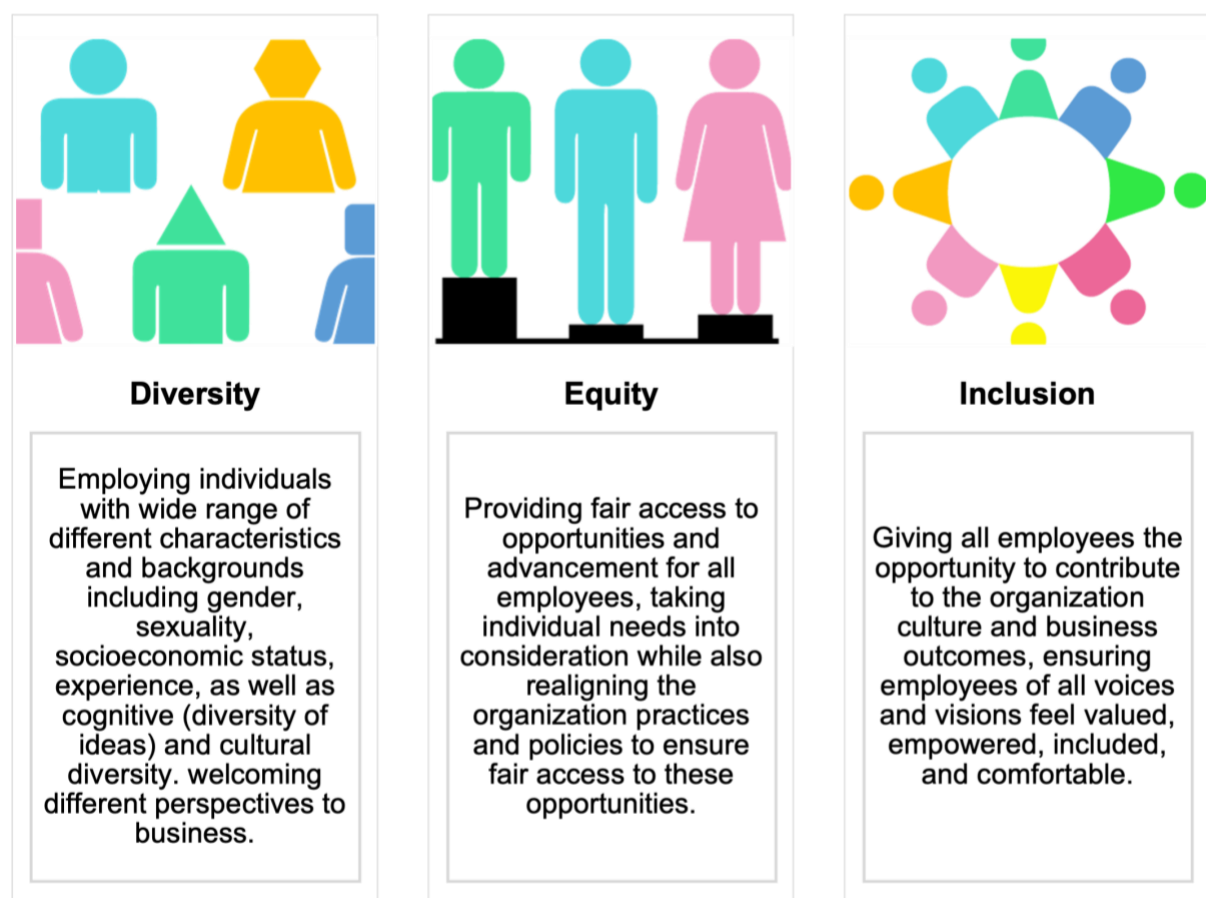
Figure 7: Defining DE&I

Diversity, Equity and Inclusion Matter

Cultivating diversity, equity and inclusion in workforce is considered more than just a hot topic nowadays, it takes more than meetings and initiatives to gain the benefits from integrating DE&I in workforce.

The benefits of fostering and implementing DE&I strategies, programs and policies are numerous ranging from improving employee engagement and satisfaction, increasing productivity and innovation to attracting and retaining talents. Below statistics can briefly describe how diversity, equity, and inclusion matter in workforce.

1- According to McKinsey, organizations in Canada, Latin America, the United Kingdom, and the United States with diverse and inclusive workforce are 35% more likely to outperform their competitors [16].
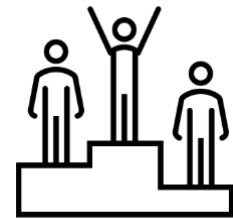
2- According to a survey conducted by BCG for more than 1700 companies in eight countries (Austria, Brazil, China, France, Germany, India, Switzerland, and the US), diverse leadership teams deliver 19% higher revenue [17].
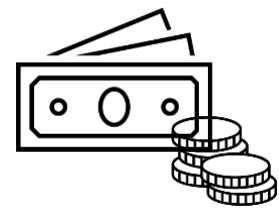
3- Heidrick & Struggles surveyed 141 companies executives in the Asia Pacific region about D&I initiatives and programs, more than 80% of respondents described their program as important or very important. 87% believe that D&I initiatives have had an impact on their career [18].
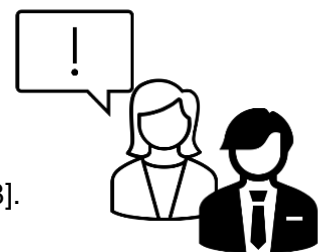
The need to create a holistic approach where DE&I coexists within the business, starting from the leadership with the buy-in from the whole organization is vital to create a shared meaning, attain mutual understanding and eventually accomplish belonging for all employees. This will achieve business goals, generate revenue growth, and bolster business reputation, it will build a resilient, engaged, empowered, and highly motivated employees to ultimately obtain better outcomes.

Appendix A – 2 provides a good example of how Airport International Group is working on expanding women involvement within its workforce and leadership roles, growing women retention rate in steady steps towards enhancing gender diversity, equity, and inclusion.

Airport Workforce Current Situation Overview, Challenges & Opportunities

> **"No problem can be solved until it is reduced to some simple form. The changing of a vague difficulty into a specific, concrete form is a very essential element in thinking."** J.P. Morgan, American Financier

Airport business is facing many disruptions following the pandemic with direct impact on its workforce. First, the increasing geopolitical instability. Political disputes can cause severe sanctions on countries, consequently affecting air services and flow of cargo. Second, the climate change, environmental footprint and pollution caused by air travel, some passengers insist to lower their carbon footprint by reducing their flights or using alternative modes of transport. Third, the perpetual drop of business travelers, the shift into conducting virtual meetings is becoming a more feasible option. Finally, human and natural caused disasters can have significant and lasting impacts on airport business.

Although the adverse effects of the pandemic underlined numerous challenges for the airport ecosystem, the key to prosper is to focus on turning these challenges into opportunities. This section will review and analyze the current airport workforce situation, identify its challenges, and introduce recommendations and opportunities in terms of:

Figure 8: Current situation overview and challenges approach

Skilled Trades, Labor, and Talent Availability in Airports Workforce

Review:

After COVID-19 struck the world, airports had to resort to harsh decisions such as wage cuts and staff termination. Alongside the accelerated return of travelers and business recovery, airports were understaffed, with the current staff facing huge work pressure operating with the same wage and work conditions prior the pandemic [19].

> "Service workers in airports report a very acute level of stress that is due to understaffing and because, understandably, the traveling public is mad about delayed flights and cancellations" Mary Kay Henry, president of Service Employees International Union (SEIU)

Analyze:

Many workers found jobs somewhere else or permanently shifted careers, where improved work conditions such as better wage or less stress levels are offered. Various resources suggest skilled trades workers, labor and experienced employees filling essential roles are likely to be in tight supply in the future due the ongoing retirement of Baby Boomers [20]. Furthermore, younger generations show greater interest in professional careers rather than skilled trades.

The Challenge:

o   Sharp shortage of skilled trades workers, labor, and talent.
o   Knowledge gap due to loss of experienced personnel.

Opportunities & Recommendations:

o   Encourage airports and stakeholders to improve employee proposition and experience, reputation, marketing, and workplace.
o   Embrace technological solutions to relieve some of the workload on workers and facilitate their tasks.
o   Create a roadmap to attract employment ready workers and graduates into airport business by providing an integrated solution to education and collaborating with technical entities.
o   Communicate the need for talents through proper channels, attracting different generations through multiple platforms to reach targeted groups.

The Presence of Multigenerational Workforce

Review:

Current airport workforce is considered one of the most diverse in terms of age, it is comprised of five generations working together within the airport ecosystem. Each group has different characteristics, work traits, expectations, experience, and communication styles. Figure (8) explains the different traits of each group [21].
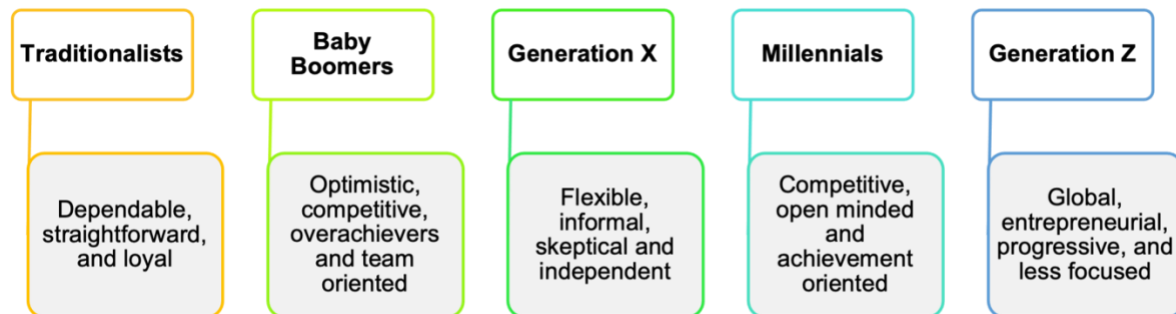

Traditionalists	Baby Boomers	Generation X	Millennials	Generation Z
Dependable, straightforward, and loyal	Optimistic, competitive, overachievers and team oriented	Flexible, informal, skeptical and independent	Competitive, open minded and achievement oriented	Global, entrepreneurial, progressive, and less focused

Figure 9: Generational groups characteristics

Analyze:

Technological development in health systems along with the increased life expectancy of humans are considered reasons why people now choose to work past the typical retirement age. The presence of multigenerational workforce provides significant benefits such as offering multiple perspectives of job requirements and specifications, reverse and cross generational mentoring, in addition to knowledge transfer and retention benefit. However, understanding and managing multigenerational workforce environment comes with its challenges.

The Challenge:

Managing a multigenerational workforce.

Opportunities & Recommendations:

o Bridge the generational gaps within the airport workforce through adequate and periodic trainings.
o Utilize digital solutions to transfer knowledge and experience between generations such as online coaching.
o Offer flexible solutions tailored to diverse workforce needs such as flexible hours and unique workspaces.

Current Airport Workforce Skills, Education, and Training

Review:

COVID-19 pandemic emphasized the talent gap that currently exists within airport workforce. The learning curve for key skills required to survive and prosper within airports business is relatively complex and extensive. Current airport workforce lacks skills needed to perform different activities such as electrical or mechanical installations, using automated tools, and light robot calibrations according to the right quality standards [22].

Analyze:

The evolution of technology and productivity changes created the need for educating and training employees for new skills, capabilities, and competencies. The fierce competition on talent and decreasing number of applied academic institutions proves the traditional ways of supplying talent into airport industry are not viable anymore. Current workforce polyvalence is remarkably dropping as employees are not adapting to workload and activity fluctuations.

> **"Success today requires the agility and drive to constantly rethink, reinvigorate, react and reinvent"**
> **Bill Gates, co-founder, Microsoft.**

The Challenge:

Current airport workforce skill gaps and the lack of harmonized competencies.

Opportunities & Recommendations:

o Address skill gaps in airport workforce on all organizational levels.
o Create a unified approach to respond to future developments and overcome potential challenges.
o Increase investment in talents by reskilling and upskilling current airport workforce to reduce workforce skill gaps and hire for agility.
o Encourage self-training by providing stimulus such as career development opportunities and incentives.
o Enroll employees in courses (online/instructor-led) to strengthen their skills and knowledge related to airport business

Appendix A – 3 introduces an innovative learning method ACI initiated to overcome training challenges through their Online Learning Center [23].

Digital and Technological Solutions

Review:

Technological advancements and digitalization are reshaping the future of the workforce. Airports are facing difficulties keeping up with the rapid transformation, current airport jobs do not have proper technological solutions nor needed personnel support. This transformation will possibly redesign the roles of airport workforce [24], as more well-trained and skilled staff with IT backgrounds will be needed.

Analyze:

The continuous surge in traffic, increased customers' expectations and growing employees needs will create the need for airport workforce to adopt the use of technology to get optimal outcomes. Although advanced technologies such as biometric face recognition and self-check-ins are currently used in airports, the growing complexity of airport environment and systems will require incorporating artificial intelligence, robotics, and business automation to serve airport employees and business.

The financial impacts of adopting new technological solutions are raising many concerns among decision makers. Airports are apprehensive about adopting new technological solutions that will become obsolete before returning its investment value [25].

The Challenge:
o Airports lack the advanced digital and technological solutions in the aforementioned technological fields that can facilitate jobs.
o Airport workforce is facing challenges adopting and committing to new technologies.

Opportunities & Recommendations
o Accelerate the introduction of technology into airports through committing to training employees in the technological fields.
o Redesign the roles of airport workers and jobs incorporating technology and innovation, Figure (9) illustrates some airport roles reshaped.
o Embrace technology to serve airport workforce with employees at the center of the technological advancement.
o Utilizing drones and robots in airport operations, Appendix A – 4 & Appendix A – 5 illustrate practical examples of how airports utilize the use of such technologies.

Polyvalent Workers

Able to accomplish multiple and different tasks and jobs, adapting properly with new responsibilities

Airside & Landside Operations Staff

Capable of utilizing and integrating technology and automation in their daily operations, such as drones, robots and automated systems

Concessionaire Workers

Focused on inherently human activities such as customer service. Able to adapt and employ different autonomous machines to perform various tasks
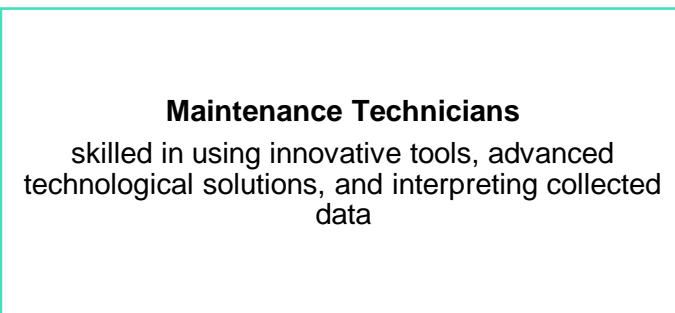
Maintenance Technicians

skilled in using innovative tools, advanced technological solutions, and interpreting collected data

Recruitment & Workforce Management Specialists

Capable of using advanced technological solutions and Artificial Intelligence to recruit, manage, operate and sustain a diverse workforce

Figure 10: Redefining airport jobs

16

Work Conditions at Airports

Review:

The perception of current airports work environment as challenging and stressful, is true. The compensation level does not make up for the workload and responsibilities workers incumbent on themselves. Frontline and security workers among many others are facing difficulties in commuting to airports, particularly during shifts.

Airports currently embrace diversity, equity, and inclusion (DE&I) within their workforce; however, they still face challenges. For example, only 5% of the world's airline pilots are females, with India`s pilots' percentage at almost 12%, considered one of the highest in the world [26].

Analyze:

In general, airport work environment is still considered as uncomfortable, demanding, and complex for labor. Airports still face the challenge of embracing remote work as many jobs require the physical presence of the employee and still lack amenities that serve airport staff. In addition, more focus should be steered toward topics related to DE&I such as race, ethnicity, disability, and gender visibility in the Asia Pacific region.

The Challenge:

o   Difficult working conditions at airports in terms of pay level, flexibility, and DE&I
o   Health concerns due to stress and work overload

Opportunities & Recommendations

o   Understand challenges and specific employees' needs.
o   Create better workplace environment and meaningful employee experience, focusing on DE&I.
o   Pursue enhanced innovative solutions and developed tools to optimize and facilitate tasks.
o   Offer competitive and attractive benefits, incentives, regular bonuses, health and life insurance, as well as provident fund.
o   Job flexibility, vacations, and paid time off
o   Provide family support and care solutions such as child day-care center, social volunteering experience, and on-site fitness center

Environmental Sustainability and Social Responsibility

Review:

Airports are often deemed to be harmful for nature, with air travel accounting for almost 2% of the global CO_2 emission [27], and negative impacts on land utilization and waste. 95% of direct airport activities' emissions emanate from fuel and electricity consumption [28]. Workers close to exhaust from aircraft and diesel engines are exposed to complex mixtures of potential health damaging air pollution.

Changi foundation by Changi Airport in Singapore and Airport International Group foundation are excellent examples of how social responsibility can change the life of an employee volunteer [29].

Analyze:

The rising concerns of airport workforce towards environment is emphasizing airports to become greener, as they are anxious about the negative impacts of climate change and carbon emissions on their health, air quality, and biodiversity. Airport workforce involved in social responsibility feel more engaged, encouraged, and motivated.

Asia-Pacific while leading global economic growth is focusing more on achieving outstanding results in carbon management, airports from different sizes are serving the best practices and leading examples in managing and reducing emissions [30].

The Challenge:

o   Health and environmental concerns over effects imposed by airports such as aircraft noise and greenhouse gas emissions.
o   Gaps in social responsibility practices impacting workforce morale.

Opportunities & Recommendations

o   Adopt new procedures and technological solutions at airports, such as Air Traffic Management (ATM) systems to efficiently use fuel.
o   Introduce Neoplant to reduce pollution [31].
o   Increase green practices in airports through conducting studies and including national communities in improvement and implementation phases.
o   Leveraging national and international regulations to promote environmental sustainability of airports thus increasing social responsibility awareness [32].

Governments Role

Review:

According to ICAO airports face challenges with facilitating hiring formalities, background checks must be completed prior starting jobs at any airport. Such approvals are lengthy and often delayed [33].

Analyze:

Governments currently provide technological solutions related to security, training, and supporting skilled workers such as air traffic controllers, medics and fire service personnel. Yet, many improvements can be made in this area to optimize the work and achieve better results [34].

> **Governments must intervene to prevent an aviation employment catastrophe, according to The International Air Transport Association (IATA) and the International Transport Workers' Federation(ITF).**

The Challenge:

Complex and delayed governmental formalities with limited financial and procedural support

Opportunities & Recommendations

- Support upskilling and reskilling of airport workforce and accelerate work permits through partnering with private companies (Public Private Partnerships).
- Offer financial support for airport workforce capacity building and training.
- Develop with governments a long-term roadmap to protect aviation industry jobs.

Risks Impacting Airport Workforce

Airport workforce undergoes several dangers and hazards that could be mapped to categorize the severity and frequency of such risks. Figure (9) illustrates the categorization of risk impacts from low to very high risk [35].

Figure 11: Risk categorization

According to the categorization, risk mitigation criteria need to be implemented at airports to tackle the major safety and security, health, and work condition risks that pose dangers on employees. Table (2) summarizes some of these risks with suggested mitigation actions.

Table 2: Risks impacting airport workforce

Risk Type	Impacts	Cause	Risk Mitigation	Category
Health	Sickness Diseases Infections	Constant & direct contact with passengers Pandemics & diseases Prolonged exposure to noise, harmful emissions, X-ray radiations	Promote health culture and compliance Provide proper protective equipment Provide welfare facilities Prevent access to hazards	**VERY HIGH**
Work Condition	Fatigue & Injuries Burn outs Knowledge gap	Long shifts and overload Variations in traffic Shortage in workforce High turnover rate	Rethink recruiting & training practices Organize working schedules, consider flexibility & balance Improve wage and contracts Embrace technology	**HIGH**
Exclusion Inequality & Discrimination	Destroy workforce morale Limited career progression prospects Depression & anxiety	Toxic workplace culture Lack of fair treatment and support for minority groups Misrepresentation, racism bias, and prejudice	Strengthen policies & procedures related to DE&I Enforce strict disciplinary actions Facilitate job experience for minority groups	**MEDIUM**
Safety & Security	Conflicts & terrorism Clashes with travelers	Geopolitical instabilities Violent passengers	Utilize AI to identify & monitor threats & risks Train personnel & setup defense	**VERY HIGH**

Creating a Collaborative Approach to Address the Future of Airport Workforce

There are several different approaches proposed to address and overcome airport workforce challenges. Only identifying the needed key skills (Appendix – B) for future workforce will not be sufficient. Every airport should work on developing and equipping its workforce with new improved and expanded set of skills. Hire for agile, adaptable, and resourceful talent and integrate these developments within their daily operations. A collaborative approach addressing all challenges with defined set of goals will be the key to focus on the prospects of airport workforce [36], [37].

Below a set of recommended approaches to how airports on national or regional levels might collaborate to address the future of airport workforce:

o   Establish a high-level roadmap that addresses, and collectively plans for, future workforce challenges

   The need to create a detailed approach/scheme to describe the transformation required by the future workforce is essential to plan for future challenges.

o   Address, measure, communicate and support in a collaborative methodology the need to train and develop the skills of the current airport workforce

   As you can't develop what you can't measure. The skill gaps need to be analyzed, measured, then communicated to responsible airports.

o   Create a shared tailored training curriculum specialized in airport needed key skills and trainings for high skilled, labor, and airport workforce entrants

   After assessing the training and skills gaps, communicating training needs and key skills analysis. A shared curriculum can be established and continuously updated to develop and maintain the skills of airport workforce.

o   Build a collective and shared career management model

   Develop shared guidelines to attract and hire talents for critical and specific roles at airports.

o   Expand regional and international staff exchange programs

The exchange of airport staff between regional and international airports can introduce a beneficial and unique experience for employees and airports. Such exchange programs will provide employees with new skills, expand their horizon, and enable them to learn new cultures and languages in addition to growing their professional network.

This approach can start off on national level to evaluate the results, then expand to international level of collaboration between airports from different continents.

o   Create an online platform with E-library and associated mobile application

Build an online platform with mobile application where airport workforce can virtually exchange knowledge, best practices, and ask for live interventions for critical cases. Showcase innovative technological and digital solutions integrating augmented and virtual reality to address the challenges opportunities and development of airport workforce.

The platform library can include shared database of accessible training information for each airport size, this platform can provide new opportunities for airport workforce to learn and develop crucial and trending skills and carry out more research.

o   Collaborate to strengthen the learning opportunities for airport workforce

Create strategic partnerships between airports on regional and national levels on human resources management and informational technology levels to explore means to develop and increase the learning opportunities for airport workforce.

o   Collaborate to expand airport colleges presence in Asia Pacific region

Regional and international airports joining forces to establish colleges at certain airports focusing on workforce training and development can deliver unexpected results and provide the following unique learning possibilities:

1) Customized learning experience that focuses on school graduates, high skilled employees and future leaders, skilled labor, and even workers.

2) Partnerships with local and international technical education institutes, trade schools and universities.

3) Regional or international internships at enrolled airports as a prerequisite to earn the college certificate.

4) Shared amenities with host airport that can serve the students and airport workforce.

Conclusion

Planning for a brighter airport workforce future need not to be a burden but rather a cultivating experience full of vigilant strategies and opportunities. In a world filled with uncertainties, particularly post the pandemic, airport workforce must have agility, resilience, diverse perspectives, and adequate resources to adapt and maneuver through future challenges. Possessing the needed key skills for the future in a work environment where corporate social responsibility CSR and diversity, equity & inclusion DE&I coexist in harmony within the airport ecosystem will achieve belonging for employees, accomplish business goals, and generate revenue growth.

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Appendix A: Case Studies

Appendix A – 1: Remote and Hybrid Work

Airport International Group: Implementing Hybrid & Remote Work Models

The Situation:

During the COVID-19 pandemic, the Jordanian government enforced measures to tackle the spread of COVID-19 such as travel ban and curfew restrictions. Many sectors were closed or were partially operating. Airport International Group introduced the opportunity to work remotely as one of the first precautionary measures for a significant number of their employees, however employees whose work dictates they be on-site to ensure the continuity of operations of Queen Alia International Airport (QAIA) had to continue to work on-site with a predetermined frequency with strict adherence to the health and safety precautions.

The Challenge(s):

Despite having multiple advantages, working remotely poses several limitations such as the lack of direct contact and maintaining work-life balance, how can Airport International Group (AIG) embrace flexibility while giving importance to the values and cultures of the organization.

The approach:

AIG conducted a pulse check few months after working from home to collect employees' feedback and better assess this option for future applicable positions. The survey with 60% participation rate resulted below:

- 70% of participants confirmed they have the needed equipment to work effectively from home
- Working from home three times a week was the preferred choice with 28% approval
- 38% of participants confirmed they complete 100% of their tasks working from home. However, 65% confirmed they finish 100% of their tasks working on site.

AIG introduced electronic signatures and provided the needed tools (laptops, system access, mobile application…) for employees to work efficiently from home. AIG is also working on simplifying using systems remotely via mobile phones. AIG currently adopts a five working days per week with flexible working hours. This emphasized the ongoing commitment of AIG to foster positive and productive work environment.

Appendix A – 2: Diversity, Equity, and Inclusion
Airport International Group: Women at the Workforce

The Situation:

Airport International Group is embracing diversity, equity, and inclusion within its workforce, considered more than a goal but a business as it is already rich in its culture and backgrounds from its workforce to its customers and shareholders. AIG is also a part of the gender diversity competition program and performs continuous focus group meetings that aim to delve deeper with employees on topics related to gender workforce diversity discussing employees' perceptions and experiences in gender diversity lens.

The Challenge(s):

Increasing women`s participation in the airport workforce and in senior management is among the critical requirements of Airport International Group`s management and its stakeholders despite the cultural, unconscious social bias and capacity (education and training) challenges.

The approach:

Airport International Group (AIG) sought to gather employee views on several topics related to workforce gender diversity in 2022 by conducting a workforce gender diversity assessment. Even though the results are not officially available, actions to improve this culture are already in progress. Below figures available from AIG database can confirm the ongoing progress towards achieving diversity, equity, and inclusion at Airport International Group:

- Women representation within AIG workforce increased from 15% in 2016 to 17% in 2022.
- Women in leadership roles percentage increased from 18% from total leadership in 2016 to 20% from total leadership in 2022.
- The average years of experience for women at AIG increased from 4 years in 2016 to 7 years in 2022.

AIG is committed to a diverse, equitable work environment that fosters inclusiveness and add value. Expanding women involvement within its workforce, increase women participation in leadership roles, and growing women retention rate at AIG in steady steps towards enhancing gender diversity.

Appendix A – 3: Online trainings and E-Learning modules in Airports Business

ACI Online Learning Centre: Multiple Airports in Asia-Pacific Region

The Situation:

The pandemic highlighted the need for continuous and remote learning and training modules. The rapidly evolving environment of airports demands constant and developed learning methods to upskill and reskill airport workforce. Airports Council International (ACI) introduced their Online Learning Centre to overcome learning challenges using innovative methods and delivering the best results. Kuwait International Airport in Kuwait and Changi Airport in Singapore are excellent examples of what successful online training can achieve.

The Challenge(s):

Kuwait International Airport new recruits were fresh graduates or employees with little experience in airport environment that needed essential training in airport operations and terminal knowledge.

Changi Airport pursued to receive Aerodrome certificate as one of its regulatory requirements. The airport aerodrome operations staff needed to receive sufficient level of safety training and engage in daily aerodrome operations such as apron control and airside inspections.

The approach:

Kuwait International Airport enrolled 97 trainees from different departments in ACI online learning programs covering such as Airport operations diploma, terminal and landside operations, and airport security.

After Changi Airport Group conducted training needs analysis, the airside operations staff attended several online courses such as Airside Operations and Airside Safety certificates through ACI Online Learning Centre.

These trainings improved the level of safety and operations within above airports. In addition, it increased the employees' level of proficiency and expanded their skillset.

Appendix A – 4: Employing Technological and Digital Solutions at Airports
Hong Kong Airport: Utilizing Autonomous Cleaning Robots

The Situation:

COVID-19 has put hygiene in the spotlight, Hong Kong International Airport ensured round the clock sterilizations within every airport facility. Intensifying preventive measures such as cleaning and disinfecting frequently touched surfaces such as escalators and travelator, in addition to limiting the capacity of elevators and increasing the accessibility of alcohol disinfectants. The harsh health and safety measures imposed many challenges on airport staff.

The Challenge(s):

Enhance Hong Kong International Airport cleaning performance during and after

COVID-19

Protect Hong Kong Airport workforce and customers from bacteria and viruses

Avoid high levels of burnout within airport cleaning operations staff

The approach:

Hong Kong International Airport identified the importance of employing self-driving cleaning robots to support in cleaning operations. self-driving vacuums called "Whiz" and Intelligent Sterilization (ISR) Robots were deployed within the airport public areas such as food courts and toilets. These self-moving robots with numerous abilities such as a 360 degree spinning head than can sterilize up to 99.99% of bacteria and viruses in the air and surfaces using ultraviolet lights and air sterilizers.

Hong Kong International Airport deployed five "Whiz" vacuums sweepers to maintain floors cleanliness at the airport`s terminal.

Utilizing robots in cleaning operations within Hong Kong International Airport provided the airport cleaning staff with the opportunity to focus on more customer specific activities and critical cleaning and disinfection tasks, improving customer satisfaction level, as well as relieving some of the stress and workload, in addition to mitigating health and safety risks posed on the airport workforce.

Appendix A – 5: Employing Technological and Digital Solutions at Airports

Zurich Airport Brasil: Adopting Drones in Airport Operations

The Situation:

Drones are considered one of most useful and effective tools used in surveying, site inspections, and construction. The construction company responsible for building Florianópolis Airport, under concession to the Zurich Airport Group, new terminal and apron used drones to survey the construction area after acquiring required authorization from air traffic controller, abiding by strict safety and security measures, and restricted flying to certain areas and specified time periods while the airport is operational. The airport operations team noticed that drones provided key decisions for effectively planning airport operations and proved to be a valuable tool for providing critical security information.

The Challenge(s):

Drones are remotely controlled and can pose many threats to airport operations such as:

Colliding with aircrafts midair

Acts of unlawful interference

Distribution of prohibited materials within airport premises

Authorizing, regulating, and operating drones in the airport, strictly abiding by the highest safety and security measures was the main challenge faced by Zurich Airport Brasil.

The approach:

Zurich Airport Brasil defined thorough framework to approach above challenges. First, an airport administration team was established to familiarize and engage employees in airport operations, safety protocols and security measures by working closely with the Air Traffic Service (ATS) agency and creating operational agreement. Secondly, analyze the optimal use for drones in the airport operations. Finally, tests to improve operational procedures were completed at least three months prior the start of the project. Adopting drones in runways, taxiways and aprons inspections, monitoring wildlife presence at the airport and security access of airport roads were some of many advantages of utilizing drones in the airport operations.

Appendix B: Recommended Key Skills for Future Airport Workforce

It is vital to identify the needed key skills to manage airport business and overcome the current and future airport workforce challenges, from competing on talent with other industries to filling the skills gaps in the workforce. Below suggested set of skills that can support airport workforce navigate through future challenges and offer the competitive advantage along with airport related examples, acknowledging these skills should be considered on all airport organizational levels:

1. Job specific technical skills:

Description: Refers to critical specialized technical knowledge and the know-how in certain field.

Managerial Level: Chief Operations Officer with IT background overseeing IT department

Non-managerial level: Electrician executing preventive maintenance on runway lights

2. Problem solving and critical thinking:

Description: Refers to identifying the problem, planning, and analyzing the situation, implementing studied and constructive solutions on smaller scale, checking the results, and acting based on the results from pervious steps. Critical thinking refers to expertly analyzing, rationalizing, and applying decisions based on evaluated action.

Managerial Level: Inventory manager balancing purchase requests against current stock

Non-managerial level: Business applications specialist determining bugs and fixing terminal activities monitoring application

3. Strategic planning and leadership:

Description: Refers to the ability in which individuals can find and develop unique opportunities and approaches, anticipate future threats and disruptions to achieve future goals. Leadership refers to the ability to guide, drive and inspire other organization members at all levels.

Managerial Level: Human Resources Director leading workforce planning and development, recruiting talent while retaining quality employees.

Non-managerial level: Customer knowledge officer promoting excellent customer service practices throughout the airport without direct control over employees

4. Agility, flexibility, and versatility:

Description: Refers jointly to the ability to respond positively and rapidly to internal and external factors, adapting to changing and new events, circumstances or demands.

Managerial Level: Chief Commercial Officer adjusting business opportunities according to customers' needs

Non-managerial level: Facilitation officer providing the best customer service experience for passengers despite traffic variations and flights change

5. Digital fluency, innovation, and entrepreneurship:

Description: Refers collectively to the knowledge and ability to determine, assess, and use information and technology effectively and ethically to perform the job, adapt to change and promote new and original ideas.

Managerial Level: Terminal manager utilizing robots in terminal operations with humans at the center of the technology

Non-managerial level: Logistics officer embracing programming in facilitating shipping and clearance processes

6. Resiliency and Change management:

Description: Refers to the ability to withstand, adapt, and recover from continuous and adverse events. While change management refers to successfully addressing, navigating through solutions, and following specified set of actions to achieve resiliency and be proactive.

Managerial Level: Chief people officer guiding stakeholders and positioning employees through changes

Non-managerial level: Landside worker recovering from accident and returning to complete specific task.

7. Soft skills, communication, and networking:

Description: Refers to the nontechnical skills that describe the character traits, communication style and relationship with others. Communication is the ability to deliver, receive and understand information effectively. Networking is the ability to build meaningful and effective connections to exchange information and ideas through effective communication.

Managerial Level: Sourcing manager communicating properly the department objectives

Non-managerial level: Warehouses worker properly receiving shipment from suppliers