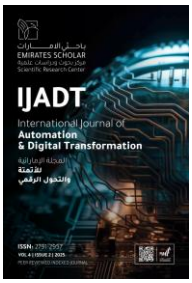

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Smart Airlift UAE: Smart Lift System for Inclusive and Accessible Air Travel

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ABSTRACT

This business proposal introduces Airlift UAE: Smart Lift System, an innovative solution designed to promote inclusive and dignified air travel for People of Determination (PoD) across airports in the United Arab Emirates. Aligned with the UAE Government's 2025 "Year of Community" initiative, the project addresses critical mobility challenges faced by PoD, including a lack of appropriate infrastructure, privacy concerns, dependence on manual assistance, and inconsistent service quality. Primary data were collected through surveys and interviews with PoD, caregivers, and airport staff, revealing key pain points such as discomfort during manual transfers, absence of dedicated mobility pathways, and insufficiently trained personnel. Findings indicate strong support for technological interventions that enhance autonomy, safety, and comfort. The proposed solution features a Smart Lift System with automated height adjustment, user-friendly controls, and integrated safety sensors, seamlessly embedded into airport infrastructure. A five-phase implementation plan outlines design finalization, regulatory approval research, prototype development, pilot testing at Abu Dhabi International Airport, and iterative improvements based on stakeholder feedback. The estimated budget of AED 100,000 covers engineering, training, maintenance, and awareness campaigns. Expected outcomes include improved independence, reduced physical strain for staff, enhanced passenger satisfaction, and alignment with national goals for equity and accessibility. Ultimately, Airlift UAE aims to set a benchmark for inclusive mobility solutions in global aviation.

Keywords: Assistive Technology, Human-Robot Interaction, Smart Mobility, Inclusive Design, Airport Automation, People of Determination, Accessibility Innovation, Dignified Travel, Robotics, UAE Year of Community, Public Infrastructure, Autonomous Lifting System

1. Introduction

The Government of the UAE is celebrating the "Year of Community" in 2025, where the main aim of the theme or objective of the "Year of Community" is to promote institutional empowerment as well as improvement of the overall quality of life (UAE Government, 2025). The new business proposal for the "Airlift UAE" aligns with the UAE Government's "Year of Community" initiative goal. This is because AirLift UAE will be providing innovative mobility solutions to people of all terminations across airports of the UAE, thereby making air travel stress-free, equitable, dignified, accessible, and inclusive for everyone. The aim of the business project proposal is to develop a holistic business project for AirLift UAE that will cover the problem statement, analysis of primary data revealing appropriate first-hand information, proposed solution, target audience, implementation plan, resources and budget, expected impact and conclusion.

2. Problem Statement

There are different kinds of people who travel by air, including those who can walk or run freely as needed. However, individuals with special needs face considerable challenges while travelling by air. One such group of people are "people of determination" who requires special assistance by any staff member and hence are dependent on any other person assisting them (Trinh et al., 2024). This often results in embarrassment, physical discomfort, and a lack of privacy for these travellers. This notion has been reconfirmed through primary data collection, including surveys and interviews. For instance, a person of determination who requires wheelchair assistance at the airport for mobility across the airport till boar dig of the aircraft is needed to be dependent on staff members or manual lifts for boarding a plane (Johnson, Adkins & Chauvin, 2020). So, this creates discomfort, loss of privacy, and embarrassment for such travellers while travelling. This is an urgent problem that requires immediate attention and resolution. People of Determination face significant barriers to air travel, including dependence on manual assistance, lack of privacy, physical discomfort, and inadequate airport infrastructure. These challenges compromise their dignity and independence, making inclusive solutions urgently necessary (Trinh et al., 2024).

3. Target Audience

The primary target audience for the proposed Smart Lift System by AirLift UAE is individuals with determination (Luo et al., 2019). It is worth noting that individuals with determination are those who have special needs and require additional care and amenities compared to the average and healthy individual. It is to be noted that the target audience of people of determination can be better described as people who possess motor disabilities, mobility impairments caused by either age or by any other disease, hearing or speaking issues, people with autism spectrum and many others. So, every person who has mobility issues is the target audience of AirLift UAE. It is also worth noting that many people of determination travel with their family members and friends. Hence, caregivers, family or friends of people of determination are also the target audience of AirLift UAE. Finally, the airport personnel are also the intended target audience for AirLift UAE, as they will benefit from reduced physical strain and streamlined travel procedures for people of determination, ultimately enhancing their customer satisfaction.

Figure (1): Elderly Person of Determination in an Aircraft Cabin Without Mobility Support

Figure (2): Wheelchair User Boarding with Assistance and Ramp Access.

4. Methodology

This study employed a mixed-methods approach to comprehensively understand the mobility challenges faced by People of Determination (PoD) during air travel. Primary data were collected through a structured survey distributed to PoD and their caregivers, focusing on accessibility barriers, comfort levels, waiting times, and satisfaction with existing airport services. The survey included both closed- and open-ended questions to capture quantitative insights and qualitative feedback.

In addition, semi-structured interviews were conducted with airport staff, caregivers, and specialists from the Zayed Higher Organisation (ZHO) to gain deeper insights into operational challenges, training gaps, and emotional impacts associated with manual assistance. The interviews explored themes such as privacy, dignity, physical strain, and the perceived need for technological interventions. Data from both sources were triangulated to identify recurring patterns and prioritize key issues. This dual approach ensured that findings reflected not only user experiences but also operational perspectives, forming a robust foundation for designing the Smart Lift System and its implementation plan.

5. Data Collection

Primary data for this study were collected through two complementary methods: surveys and semi-structured interviews.

Survey: A structured questionnaire was distributed among caregivers, family members, and professionals supporting People of Determination (PoD). A total of 21 respondents participated, representing diverse roles such as parents **,(%23.8)** professional caretakers **,(%28.6)** siblings (14.3%), and others. The survey included both closed and open-ended questions addressing comfort levels, accessibility barriers, waiting times, satisfaction with airport staff, and openness to technological interventions.

Interviews: Semi-structured interviews were conducted with staff from the Zayed Higher Organisation (ZHO) and caregivers of PoD. The interviews explored themes such as physical and emotional challenges during manual transfers, dignity and privacy concerns, feedback from families, and perspectives on adopting innovative solutions such as smart lifts.

This dual approach ensured that the data reflected both user experiences (from families and caregivers) and operational perspectives (from airport-related professionals). The combination of quantitative survey data and qualitative interview insights provided a robust foundation for identifying challenges and shaping the proposed Smart Lift System.

6. Data analysis

The survey results firstly indicated that it is uncomfortable for a person of determination to travel by air alone with assistance provided by the airport or airlines (Roh, Heo & Whang, 2019; Aithal & Aithal, 2020). The main challenges highlighted in the survey that make air travel uncomfortable for people of determination include inadequate and inappropriate equipment, physical discomfort, privacy issues, and long waiting times. Thirdly, the respondents have portrayed that enhancement of privacy, safe and comfortable seating, faster boarding facilities and lower instances of manual handling are the features that people of determination mainly desire. However, most respondents perceive that airport staff are well-trained; however, the services fall short, indicating a need for new, modern technologies and

facilities. This is why the majority of respondents support the new AirLift UAE idea.

Figure (3): Boarding Challenges for Wheelchairs without Specialized Equipment

A similar notion has also been revealed by the analysis of the interviews as well (Mazhar et al., 2021; Knott et al., 2022). Firstly, according to the respondents the biggest challenges faced by the people of determination are Autism spectrum disorder, lack of proper available needs like appropriate food, limited tolerance for children, lack of proper trained personnel to cater appropriate services, lack of proper communication by airport personnel to these people of determination, absence of appropriate guidance or tools at airports like signs or guiding services, non-presence of dedicated entrances and ways from the entrance to the boarding gate for the people with special needs, lack of flexibility, lack of custom fitted wheelchair, sole reliance on wheelchairs in absence of alternative mobility mechanisms at airports, lack of experience and embarrassment during travel for the people of determination.

The second case-oriented question asked during the interviews concerned the feedback respondents received from caretakers and families regarding the accessibility of air travel for persons with disabilities. This revealed a lack of understanding and sensitivity from the airport personnel towards people of determination. Apart from this, it was also found that there was an absence of special service lines which could have eased the experience of the person of determination, especially related to disembarking and boarding. It was also reported that leading airports lack transportation of luggage facilities, safety and comfort needs, guidance, priority support, and special paths for people with special needs, causing inconvenience to people of determination during air travel.

Thirdly, it was unanimously found that the patients with emotional and physical difficulties face many difficulties as well as discomfort when they are being assisted or lifted by any personnel manually. This mishandling of such patients by inexperienced staff not only brings discomfort for the patients themselves but also brings embarrassment for the patient and their family or friend with whom they are travelling. It is then found that all five respondents unanimously and inherently support the adoption of new technologies, such as innovative lifts, which, according to them, would enhance the comfort and independence of people with determination. It was also revealed from the analysis of the interviews that dignity and privacy during mobility are of material importance for people of determination. This clearly demonstrates that people of determination value their respect, privacy, dignity, independence, and comfort during air travel, which they are not getting in today's world. This is also a direct reason as to why they and their immediate family members or friends are inclining towards the support of adoption of new modern technologies like the AirLift, which is an innovative mobility solution for people of determination that is capable of immensely assisting them in their air mobility within the airport during air travel.

7. Proposed Solution & Expected Outcomes

The proposed solution is the Smart Lift System, a technologically advanced mobility aid designed to address the challenges faced by People of Determination (PoD) during air travel. The system features automated, height-adjustable boarding lifts equipped with smart sensors to ensure user safety, comfort, and independence. Its intuitive, user-friendly controls allow both PoD and airport staff to operate it with ease, minimizing reliance on manual assistance and reducing the physical strain on staff. The system is designed to seamlessly integrate with existing airport infrastructure, enabling smooth coordination

across check-in, boarding, and disembarkation processes.

The proposed solution will take the shape of the Smart Lift System, designed and manufactured by AirLift UAE. The problem statement above backed by the primary data gathering and analysis revealed that the people of determination are facing innumerable issues concerning mobility during air travel like lack of presence of proper facilities and tools needed by them to travel safely and comfortably followed by lack of proper training of airport personnel to address their issues, over-waiting issues for personnel to carry them to appropriate gates, lack of adequate lift facilities that could be take them to appropriate gates. So, accessibility within airports and many other places is a significant issue for people with disabilities. AirLift UAE will inherently address these issues with their Smart Lift System (Saxena & Cao, 2021; Rahdari et al., 2024). The Smart Lift System's main features, which address the needs of people with disabilities, begin with adjustable and automated boarding lifts that enhance aeroplane accessibility for individuals with special requirements.

Secondly, the controls provided within the Smart Lift System will be user-friendly and interactive, enabling easy use by individuals with determination, as well as by new airport staff assisting them. This will also ensure that there is no disruption of services, even from new airport staff who do not possess adequate training and expertise in handling persons with determination. Thirdly, the Smart Lift System is equipped with smart sensors that ensure both comfort and the safety of users, particularly individuals with disabilities. Finally, this modern Smart Lift System can be easily integrated with the holistic airport infrastructure and systems, facilitating smoother coordination within airports, especially for people of determination. So, on a holistic note, it can be said that the Smart Lift System will enhance independence, safety, comfort, flight boarding and disembarking experience, equality and inclusion within the transportation services to the people of determination. Furthermore, the Smart Lift System will not only resolve the issues of people of determination during their travel but also contribute to the innovation and accessibility goals of the UAE, as well as support its Year of Community initiative.

The expected outcomes include significant improvements in independence, privacy, and dignity for PoD, creating a more inclusive and equitable air travel experience. By reducing waiting times and manual transfers, the Smart Lift System enhances overall efficiency and passenger satisfaction. Furthermore, this solution aligns with the UAE's 2025 "Year of Community" initiative by advancing accessibility, social empowerment, and community well-being, positioning UAE airports as global leaders in inclusive air travel.

8. Implementation Plan

- ***For Week 1:*** The design of the Smart Lift System is to be finalized after meeting with designated technology providers, Zayed Higher Organisation partners, and other airport partners (He et al., 2020).
- ***For Week 2:*** The approvals from the airport management as well as from the aviation authorities will be acquired for testing the Smart Lift System within various airports of the UAE.
- ***For Week 3:*** Within the third week, the prototype of the Smart Lift System will start to be developed, along with training of the airport personnel on different protocols of accessibility related to the Smart Lift System (Ebuenyi et al., 2021).
- ***For Week 4:*** Within week four of the implementation, a pilot program at Abu Dhabi International Airport, a major UAE airport, will be run to gather feedback from users of the Smart Lift System.
- ***For Week 5:*** Improvements are to be made to the Smart Lift System based on the feedback received from the pilot program (He et al., 2020).

The implementation plan for AirLift UAE will have five key phases, each informed by a weekly approach to allow organized and seamless development with our partners. The plan will progress through five phases: finalizing the Smart Lift System with technology partners, reviewing

regulatory requirements, developing and training for a working prototype, piloting the system at a major UAE airport, and analyzing user feedback to refine and optimize the solution. The incorporation of a phased approach highlights the important aspect of a seamless system that deliberately contributes to the goal of an inclusive and dignified air travel experience for People of Determination.

Phase one will focus on finalizing the Smart Lift System's features, including automatic height adjustments, safety sensors, and controls for ease of use. As students, we will also simulate this process through dialogue with professionals from the Zayed Higher Organisation for People of Determination, gaining their expertise in understanding the needs of people with mobility impairments. Their feedback will add to our user-centred design with the focus on ensuring independence and safety. Since the students will not likely be the only ones using an actual Smart Lift System, we would also work with engineers and airport consultants in phase one, to assist in embedding the product into existing systems (He et al., 2020).

The next stage is to determine what regulatory requirements will be necessary for the Smart Lift System to operate in UAE airports. We will research permissions and compliance needs from airport management and the General Civil Aviation Authority (GCAA) to understand operational and legal requirements, simulating this step as part of the academic project.

Phase three marks the development of the Smart Lift System prototype. In a proper context, this would mean building the lift physically, integrating smart controls/sensors and testing basic capabilities and training airport staff to operate it and assist People of Determination. In our case, we will simulate this phase and describe what the training would look like (for example, accessibility protocols, safety protocols and best practices in how to communicate).). Ebuenyi et al. (2021) attribute highly trained staff for improving the travel experience for people with disabilities, and it is a necessary component of our plan.

Phase 4 involves piloting the Smart Lift System through a simulation that replicates its operation in a real airport setting, such as Abu Dhabi International Airport. The purpose of the pilot was to assess the user's experience, gathering feedback from People of Determination, their caregivers, and trained staff. In our project, we will demonstrate this through a process of interviewing and surveying stakeholders (e.g., ZHO staff and families) and gathering their input about the system's usability and safety. This phase will verify that the system meets user needs and expectations.

The final phase involves assessing the pilot results and analyzing options for improvement. Feedback will be reviewed to identify technical, design, and training enhancements, with results summarized for stakeholders and recommendations provided for further development. We will provide a summary of the feedback to stakeholders and recommendations for future development. As they argue, He et al. (2020) emphasise that continuous improvement is essential for any assistive technology project to empower users and maximize effectiveness.

9. Budget and Resources

The significant resources would include human resources in the form of trainers of ground staff, a project manager, mechanical engineer and many others. The budget is as follows:

Particulars	*AED*	*Justification*
Prototype manufacturing and installation	35,000	The cost includes all materials, pre-fabricated mechanical components, and the construction of a fully operational Smart Lift System, as well as transportation and integration in a test airport environment.

Engineering and design of Smart Lift Systems	40,000	Qualified professional engineers and designers will manage the design of a safe and usable system, which includes technical drawings, software programming, sensor systems, and user testing.
Airport staff training sessions	10,000	Appropriate training is important to ensure staff can operate the Smart Lift safely and support users with confidence and care. This budget includes developing training materials, workshops, and parameters led by experts.
System support and maintenance	10,000	Maintenance also maintains the function, safety, and reliability of the lift system, including technical inspections, software updates, and replacing unwanted parts during the pilot project.
Awareness and marketing campaigns	5,000	Disseminating information about the Smart Lift System is crucial for raising public awareness and encouraging airport authorities to adopt it. This involves developing and providing educational materials, conducting digital campaigns, and distributing handouts and printed outreach materials.
Estimated total budget	100,000	The total budget covers the complete lifecycle of the development, testing, and promotion of the Smart Lift System and also encompasses a complete and balanced investment in technology, training, maintenance, and awareness to ensure proactive operation and impact.

10. Expected Impact

The first expected positive effect is to be perceived for people of determination by enhancing their level of independence, well-being, flexibility, dignity, comfort, safety and privacy. This is because users themselves can operate the Smart Lift Systems without the need for any airport staff. Secondly, the improved sensors of the lift system will enhance both the safety and comfort of the users. Secondly, the operational benefits to the airports will increase as the workflows become safer and faster, and the burden on personnel will decrease drastically, along with an estimated enhancement of satisfaction and safety for people of determination. Finally, it is expected that the smart lift system will facilitate community empowerment and social change by enhancing the equity and inclusivity of transportation for all people in society.

11. Conclusion

The thorough analysis of the aviation sector revealed that specific issues exist for people of determination in the UAE. This has been proved by the analysis of the primary data collected through interviews and surveys. The main issues affecting people of determination during air travel include safety, security, comfort, flexibility, independence, inadequate staff training, privacy, and ease of access and movement through the airport,

particularly during disembarkation and boarding. These issues are a pressing need that can be easily addressed by the Smart Lift Systems in the UAE. It is anticipated that the implementation of Smart Lift Systems within UAE airports will lead to more prominent community empowerment and social change, thereby facilitating the achievement of the UAE Government's Year of Community initiative.

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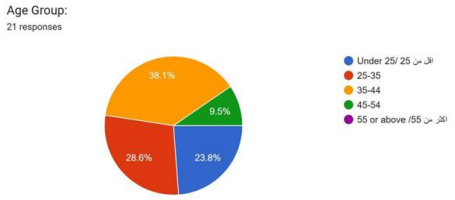
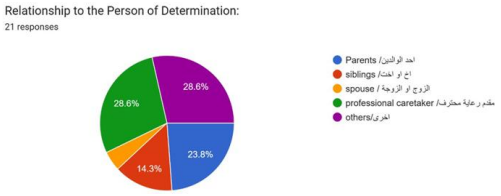
13. Data Visualization

Survey Questions and results

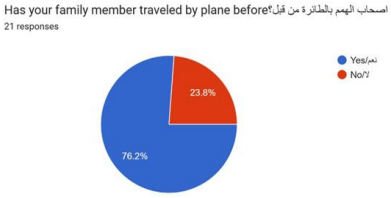
The majority of respondents (38.1%) were aged 45-54, followed by 28.6% in the 35-44 age group and 23.8% under 25. Only 9.5% were aged 25-35, and none were above 55, indicating that most participants were middle-aged adults who likely have caregiving roles for People of Determination.



Respondents were evenly distributed among parents (23.8%), professional caretakers (28.6%), and others (28.6%), with fewer siblings (14.3%) and spouses (4.8%). This suggests a diverse representation of individuals involved in the travel experience and caregiving process for People of Determination.



Most respondents (76.2%) reported that their family member with determination has previously traveled by air, while 23.8% have not. This shows that the majority have direct experience with the challenges of air travel, making their feedback highly relevant for designing inclusive solutions.

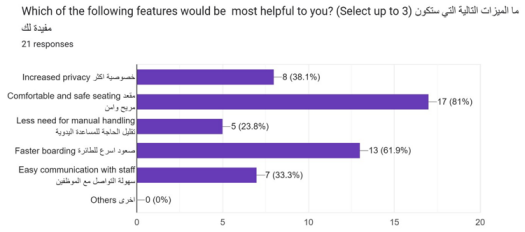


Most respondents (61.9%) have traveled by plane with a family member who is a Person of Determination, while 38.1% have not. This indicates that a majority have first-hand experience with the challenges faced during air travel.

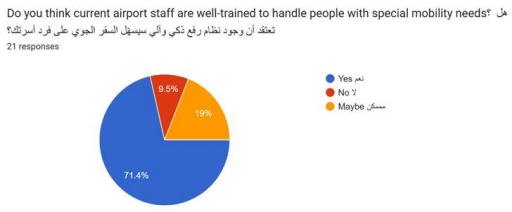
Only 14.3% found the boarding and exiting process very comfortable, and another 14.3% rated it very uncomfortable. The largest group (42.9%) found it only somewhat comfortable, with 28.6% saying it was uncomfortable, showing a general dissatisfaction with current processes.

The most frequently reported challenge was physical discomfort (52.4%), followed by long waiting times (42.9%), lack of proper equipment (33.3%), and privacy issues (33.3%). Lack of trained staff (14.3%) and other issues (19%) were also highlighted, underscoring the need for improved facilities, training, and support systems.

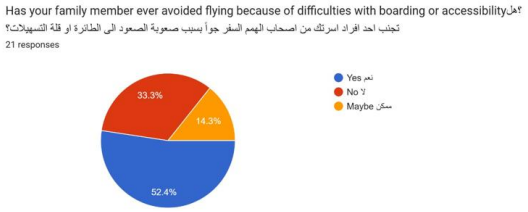
The majority of respondents (81%) selected comfortable and safe seating as the most helpful feature, followed by faster boarding (61.9%) and increased privacy (38.1%). Easy communication with staff (33.3%) and reduced need for manual handling (23.8%) were also valued, highlighting the need for solutions that prioritize comfort, efficiency, and dignity.



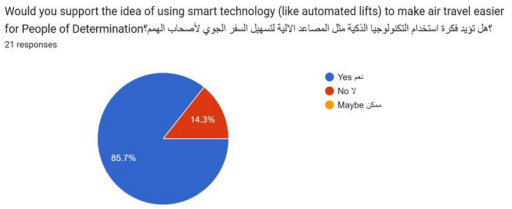
Most respondents (71.4%) believe that airport staff are well-trained to handle people with special mobility needs, while 19% expressed uncertainty and 9.5% disagreed. This indicates general confidence in staff capabilities but still points to room for improvement in training and sensitivity.



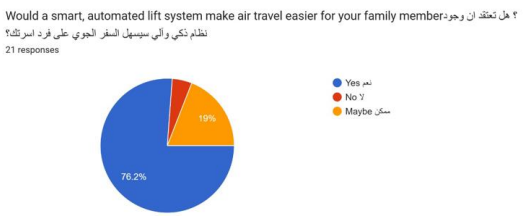
Over half of the respondents (52.4%) reported that their family members have avoided flying due to boarding or accessibility difficulties, while 33.3% have not faced this issue and 14.3% were unsure. This finding underscores the negative impact of current accessibility gaps on air travel participation.



A large majority (85.7%) of respondents support the idea of using smart technology, such as automated lifts, to make air travel easier for People of Determination. Only 14.3% disagreed, showing strong acceptance of technological solutions to improve accessibility and independence.



Most respondents (76.2%) believe that a smart, automated lift system would make air travel easier for their family member, while 19% were uncertain and only a small minority (4.8%) disagreed. This highlights strong confidence in the potential of such innovations to enhance travel experiences.



Interview Questions

Interview Introduction

Full Name (Optional):

Job Title/Role at ZHO:

How many years have you worked with People of Determination?

- Less than 1 year
- 1-3 years
- 4-6 years
- 7+ years

Have you ever accompanied or supported someone during air travel?

- Yes
- No

Standard Interview Questions

1) Based on your experience, what are the biggest challenges People of Determination face when flying or moving through airports?
2) What feedback have you received from families or caretakers about air travel accessibility?
3) Are there any physical or emotional difficulties patients face when being lifted or assisted manually?
4) What do you think about using technology like smart lifts to improve independence during travel?
5) From your perspective, how important is privacy and dignity during mobility assistance?
6) Would ZHO be open to testing or advising on travel-accessibility innovations like this in the future?

Responses

Participant 1: Mouza Mohammed Al Muhiri

Job Title/Role: Head of Health Department, ZHO

Experience: 7+ years

- *Challenges Faced:* Physical accessibility remains the biggest challenge. Many airports lack suitable ramps, wide seating spaces, or properly designed onboard amenities to ensure smooth movement from terminal to aircraft.

- *Family/Caretaker Feedback:* Families often highlight the weight and suitability of assistive devices such as wheelchairs or lifts. Some are too heavy to replace or maneuver. Restroom use during flights is a major concern, particularly for those requiring diaper changes, due to poorly equipped facilities.
- *Physical/Emotional Difficulties*: Psychological challenges are significant many feel embarrassed during transfers, especially when several staff or companions are required to assist. This can negatively impact their sense of independence and emotional comfort.
- *View on Smart Lift Technology:* "Using smart lifts would greatly enhance independence and reduce the need for constant manual assistance. It would promote privacy and self-confidence while making transfers safer and more efficient."
- *Importance of Privacy and Dignity:* Maintaining dignity during transfers is essential. Traditional manual lifting often makes individuals feel like a burden, affecting emotional well-being and self-esteem.
- *ZHO's Openness to Innovation:* ZHO would welcome involvement in testing and advising on accessibility solutions. The organization is committed to promoting dignity, privacy, and global best practices in empowering People of Determination.

Participant 2: Mariam Al Alawi

Job Title/Role: Nurse, ZHO

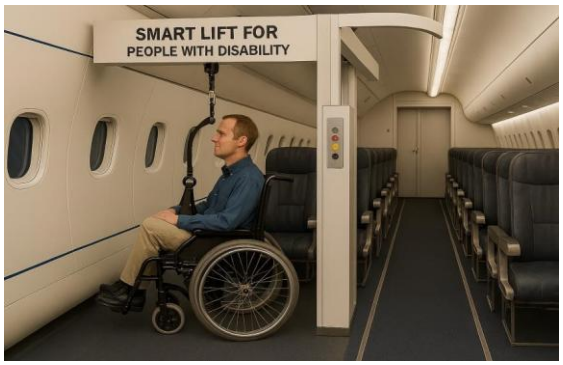
Experience: 4-6 years

- *Challenges Faced:* Airports often lack adequately prepared pathways and flexible movement mechanisms. Reliance on wheelchairs alone limits freedom and can cause difficulties, especially for those with diverse mobility needs.
- *Family/Caretaker Feedback:* Caregivers report that airplane seats are not adapted for comfort or stability, leading to fatigue during flights. They emphasize the need for practical, in-flight mobility solutions.
- *Physical/Emotional Difficulties:* Manual lifting can cause physical pain and emotional distress. Some staff overlook individual needs, which can lead to discomfort and embarrassment. Proper training is critical for safe and respectful assistance.
- *View on Smart Lift Technology:* "I strongly support smart lifts. They improve service quality, reduce manual intervention, and safeguard dignity and privacy. This technology would make boarding and disembarking far more humane."
- *Importance of Privacy and Dignity:* "Respecting privacy is a matter of professionalism and humanity. It aligns with UAE leadership's commitment to inclusion, helping individuals maintain dignity and independence."
- *ZHO's Openness to Innovation:* ZHO would likely participate in testing and awareness initiatives. A digital platform could also be created to connect travelers with airport systems, enabling booking, journey tracking, and feedback for continuous improvement.

Key Themes

- *Accessibility Gaps:* Limited infrastructure, lack of flexible mobility options, and insufficient restroom facilities.
- *Emotional Well-Being:* Privacy and dignity are repeatedly emphasized as critical for comfort and independence.
- *Training Needs:* Both participants stress the importance of professionally trained staff to reduce discomfort and risk during manual assistance.
- *Support for Innovation:* Strong agreement that smart lift technology and digital solutions would enhance independence, privacy, and overall user experience.

13.3 Concept images for the smart lift


SMART LIFT FOR
PEOPLE WITH DISABILITY