

Financial Incentives For Wheelchair Accessible Airplanes

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Executive Summary

All Wheels Up is a not-for-profit organization that is crash testing wheelchairs and wheelchair securement spots for commercial flight. Currently, wheelchair users are unable to board an airplane in the safety of their own wheelchair, risking injury or damage to their wheelchairs, deterring many from traveling. Implementing a dedicated wheelchair securement spot on airplanes is viewed as a potential loss of revenue by airlines. This paper investigates potential cost savings and revenue streams airlines could gain by implementing a wheelchair spot.

To build a comprehensive report, we explored many avenues of costs airlines are currently incurring by not having a wheelchair spot. We found five examples of areas that airlines could achieve significant cost savings with a dedicated wheelchair spot. (1) Wheelchair repairs: under the Air Carrier Access Act, airlines must cover the cost of repairing damaged wheelchairs. Using Air Travel Consumer Reports, we forecasted costs of wheelchair repairs over the next 10 years. Industry-wide, over \$45 million could be saved annually, with major U.S. airlines saving upwards of \$3 million themselves. (2) Tarmac turn time: delays on the tarmac are costly, with every minute a plane is idling equating to a loss of \$74. Estimating the time it takes a wheelchair user to board and deboard an aircraft to be 16 minutes total, the delay caused by one wheelchair user can cost over \$1000 per flight. (3) Legal fees: there are a number of risks associated with transferring a person in and out of their wheelchair during boarding, resulting in many injuries. In a recent suit, an airline compensated a wheelchair user \$4 million after they were injured by being dropped in transfer. (4) Worker compensation: based on the Bureau of Labor Statistics, baggage handlers face risk of overexertion resulting in arm, shoulder, or back injuries that can cost an airline up to \$50,000 in compensation. A wheelchair can weigh five to

six times a standard luggage item, increasing risk of injury. (5) Vouchers: through our own survey administered to wheelchair users and caregivers, respondents report receiving vouchers between \$100 - \$300 as goodwill from airlines after having their wheelchair damaged. The industry can save \$350,000 annually by reducing the need for such vouchers

There are two potential revenue gains for airlines. (1) Increased demand: The wheelchair population is estimated to increase by 2 million each year. Further, 97% of our surveyed wheelchair users report that they'd fly more often with a dedicated spot, and 70% report flying with one or more additional people. Airlines can fulfill this demand with a dedicated wheelchair spot.. (2) Halo effect: customers reward company actions that have a positive effect on society. Our survey shows that wheelchair users and caregivers are far more likely to fly with an airline that were to implement a dedicated wheelchair spot. Overall, by implementing a wheelchair securement spot, airlines can expect to save millions in costs, introduce revenue streams that have yet to be enjoyed, and provide wheelchair users with a safe and worry-free travel experience.

Introduction

In 2019, approximately 29 wheelchairs were damaged each day by airlines (Kaji, 2021). To make matters worse, when wheelchair users are unable to use their damaged chairs, they may suffer health-related consequences from pressure sores and, in severe cases, even death (Reyes, 2022). The current process for a wheelchair user to fly commercially is to get transferred to a temporary wheelchair at the airport, while their personal wheelchair is sent to be stored for the upcoming flight. Then, they get transferred by airline employees into an airplane seat. This results in excessive wheelchair damages and health consequences. In-depth research has shown that the alternative of adding a wheelchair securement spot on airplanes, allowing wheelchair users to ride in their personal wheelchair, is technically feasible to engineer (Transportation Research Board, 2021). However, even when presented with this information, airlines are hesitant to get on board, claiming that they would lose millions of dollars a year by implementing a wheelchair spot. In this report, we analyze the potential revenue and savings for airlines to prove that a wheelchair spot is worth considering.

Methods

Assumptions

We worked under multiple assumptions to maintain a reasonable scope for the project. First, because there are many potential implementations of a wheelchair securement spot (such as varying how many aisle seats it would take up) that are still under consideration, we did not include the cost of implementation in this report and instead focused on potential revenue and savings. The decision to present our findings as cost savings for airlines and industry as a whole,

independent from any projected loss of revenue, was to make findings generalizable for all airlines. Other assumptions surrounding the implementation of the securement spot include: the wheelchair spot and the wheelchairs themselves will be appropriately certified under applicable regulations, and the wheelchair spot will accommodate both electric wheelchairs and modified manual wheelchairs. While these details may change in the future, our analysis should still be insightful if the wheelchair spot accommodates only a fraction of wheelchair types.

Next, we make a few assumptions about our data. First, for the Department of Transportation data: airline data trends from before February 2020 will resume after the COVID-19 pandemic, wheelchair flight trends are proportional to overall flight trends, and airlines report accurate data on wheelchair damages. Because wheelchair data has only been reported by airlines since 2019, and the data from 2020 onward has been skewed by the COVID-19 pandemic, we based our forecasting analyses on the 2019 data and the assumption that it will be proportional to overall flight trends. Finally, in order to draw conclusions from our survey, we assume that our respondents are representative of the overall population of wheelchair users and caregivers or loved ones of wheelchair users.

Survey

To gather data about the habits and thoughts of wheelchair users and caregivers, we conducted a survey between April 18 and May 1, 2022. Our survey was conducted through a digital Google Form and distributed via All Wheels Up, a University of Washington student organization called HuskyADAPT, and Ability 360. We received a total of 137 responses, 87 of which were wheelchair users and 48 of which were caregivers. Further, 112 had flown either with their own wheelchair or alongside a wheelchair user, and 24 had not. For respondents who had flown before, we asked how many times a year they fly, how many additional people they

typically fly with, and if they would choose to fly more often if they could board using their own wheelchair. For respondents who had not flown before, we asked if this was due to (a) risk of injury to wheelchair user, (b) risk of damage to wheelchair, (c) process seems overwhelming or complicated, or (d) cost. For both categories of respondents, we asked if they would choose to fly with a specific airline with the option to (a) board using their own wheelchair, (b) wheelchair specific storage, (c) employees specifically trained in transfers, or (d) wheelchair accessible bathrooms. For respondents that experienced prior injuries or wheelchair damages or losses from airlines, we asked if they reported the incident, and if they received (a) covered repair costs, (b) refunded flight, (c) additional voucher in cash, and/or (d) additional voucher in airline miles. Meaningful results will be discussed further with applicable considerations.

Forecasting

We forecasted ten years of wheelchair repair costs. To do this, we first collected data on the number of scheduled flights from 2010 to 2019 using the Air Travel Consumer Reports from the US Department of Transportation (DOT, 2022). Based on the availability of data for this time range, we forecasted flights and repair costs for the six major U.S airlines: Alaska, American, Delta, JetBlue, Southwest, and United. We then forecasted the number of scheduled flights from 2022 to 2031 using the holt() function, which performs double exponential smoothing, with a damped trend from the “forecast” package in R, leaving out 2020 and 2021 because of the effects of the COVID-19 pandemic on the airline industry. To convert the forecasted number of scheduled flights to a monetary value, we calculated the ratio of mishandled chairs to scheduled flights in 2019. We chose to use wheelchair data from 2019 because this is the first full year of data available, and the only full year of data unaffected by the COVID-19 pandemic. We then assumed the average cost of repair per damaged wheelchair to be \$4,600. Delta paid an estimated

\$2.6 million Delta paid in wheelchair repairs in 2016, which was divided by the 563 wheelchairs Delta damaged in 2019 (Kaji, 2021; DOT, 2022).

Legal Documents

We researched lawsuits brought onto the six major U.S. airlines that came directly or indirectly as a result of not having a dedicated wheelchair spot on airplanes. Utilizing the Public Access to Court Electronic Records (PACER), we looked through relevant case files where wheelchair users brought lawsuits onto airlines for personal injuries or airline misconduct. For the purpose of our research, we defined “relevant” as describing cases that could have been avoided if wheelchair users would have been able to board a flight in their own wheelchair. This narrowed our scope to instances where a passenger was dropped in transfer to their seat, suffered injuries as a result of airport or aisle wheelchairs, or was subject to misconduct due to boarding a flight without their own wheelchair. We chose to also refine our research to the last decade in order to find contemporary cases that could serve as precedent for future cases. Through our searches, we were able to find pertinent case summaries along with settlements.

Results

Wheelchair Repairs

The largest source for airlines to potentially save money by implementing a dedicated wheelchair spot is by minimizing the cost of wheelchair repairs. In 2019, airlines damaged around 29 wheelchairs a day (Kaji, 2021). Due to the Air Carrier Access Act (ACAA) passed in 1986, airlines are financially responsible for all of these repairs and replacements (Paralyzed Veterans of America, 2022). If the average cost of repair for a wheelchair is around \$4,600, in

2019, the airline industry spent over \$45,000,000 on wheelchair repair costs alone. Figure 1 shows the forecasted wheelchair repair costs for six major U.S. airlines.

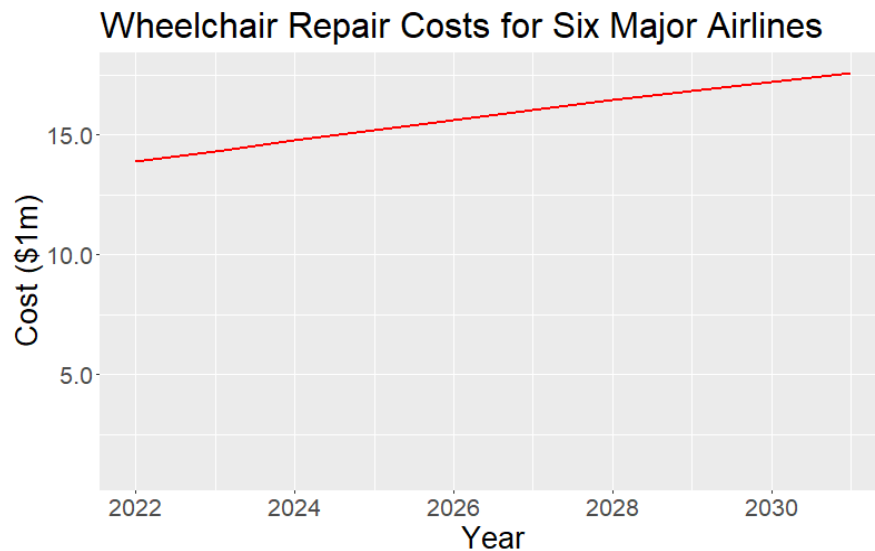


Figure 1. Forecasted cost of wheelchair repairs from 2022 - 2031 for six major U.S. airlines

Tarmac Turn Time

It's estimated that the cost for each minute a plane was idling in the parking position in 2019 was \$74 (Airlines for America, 2020). As the price of fuel has increased over the past three years, this number is an underestimate for the cost in 2022, but will be used for the purpose of our analysis. The lack of a dedicated wheelchair spot means there are a few instances where a flight with a wheelchair user has increased idling time: transferring a wheelchair user on and off the plane, and waiting for the wheelchair to be returned to the gate from storage. If the wheelchair user is the first on the plane for boarding, and the last off the plane for deboarding, taking around 8 minutes each time, this is over \$1,100 being spent on the boarding time of one passenger. Adding a dedicated wheelchair spot would reduce the time needed to transfer the wheelchair user to the aisle chair, and onto the plane, by allowing the wheelchair user to board themselves. The estimated time for the process from the door of the plane to securement is

reduced down to only 30 seconds with this solution. Further, according to the ACAA 14 C.F.R. §382.125, airlines “must provide for the checking and timely return of passengers' wheelchairs, other mobility aids, and other assistive devices as close as possible to the door of the aircraft, so that passengers may use their own equipment to the extent possible” (Code of Federal Regulations, 2022). This means that airlines are paying for every minute longer than the deboarding process that it takes to return a wheelchair to a wheelchair user. In our interview with the Wheelchair Advisory Committee, several members had to wait for over an hour to receive their wheelchairs. Say this time is an extra half hour longer than the deboarding process, that’s over \$2,000 spent on one passenger. If the wheelchair user was already in their personal wheelchair, they could deboard the plane alongside other passengers, reducing this cost.

Legal Fees

The process of boarding and deboarding a plane for passengers who are wheelchair users poses several injury risks in its current state. One of the most common causes for injuries sustained by wheelchair users on flights comes as a result of being dropped in transfer from an aisle chair to their seat in the airplane. Without a dedicated wheelchair spot, the process of transferring a passenger from an aisle chair to their seat is necessary in many cases. Even if flight attendants are properly trained, having them pick up a passenger and guide them into a seat in the confines of an airplane aisle does lend itself to the potential for accidental drops. In some cases, injuries incurred on behalf of the passenger are severe enough to bring about lawsuits. In 2019, a woman who was dropped in transfer to her seat a couple of years prior was awarded nearly \$4 million in a personal injury lawsuit she had filed (*Fulton v. United Airlines, Inc.*, 2021). While not every injury sustained from being dropped is as serious as was Mrs. Fulton’s, the potential for having to payout millions of dollars in a similar case exists now that some precedent has been

set in such a recent suit. A wheelchair user being dropped in transfer is not the only scenario that could incite a lawsuit, though. Other causes for lawsuits being brought on airlines from wheelchair users have included injuries suffered from defective airline wheelchairs (Zubaida Khanum vs Gateway Frontline Services, Inc. et al, 2020) as well as passengers having to crawl on/off the plane (Kanaan v. Delta Air Lines, Inc. et al, 2013) due to unavailability of assistive equipment (aisle chair, lift, etc.). Whether or not an airline is found culpable in any given lawsuit, there are still litigation costs incurred along with undesirable public relations.

Worker Compensation

According to the National Safety Council (2021), the cost of worker compensation in 2018-2019 for arm and shoulder injuries was \$47,827, for lower back injuries was \$37,309, and for upper back injuries was \$35,833. 40% of aviation industry worker injuries are due to overexertion and bodily reaction, and 46% of those were due to luggage, which is 18% of total injuries (Moller et al., 2020). Although there is a larger number of enplaned baggage in comparison to the number of enplaned wheelchairs, the average checked bag is around 50 lbs, whereas a power wheelchair can weigh upwards of 250 lbs. In addition, according to a time and force study by Holloway et al. (2015), the force required to board wheelchair users onto an aircraft exceeds the Health and Safety Executive guidelines for women in all cases and for men in most cases. This only takes into account pushing the aisle chair onto the plane, not the transferring of the passenger between wheelchairs or into the aisle seat. Overall, the handling of wheelchairs for storage, and boarding wheelchair users onto the plane, can cost airlines thousands of dollars per year. Adding a dedicated wheelchair spot will reduce the need for wheelchair storage and passenger transfers, reducing overexertion injuries for baggage handlers.

Vouchers

Each airline's voucher policy can vary in amount and occurrence, so we estimated the average cost of vouchers, and multiplied it by the number of flights yearly to calculate the annual cost of vouchers. Based on our survey results, ten of 55 (18%) respondents who had experienced wheelchair damages or injuries said they did receive a voucher in a price range of \$100 - 300. If 686,000 wheelchairs were enplaned in 2019, this comes out to a range of \$190,000 - \$570,000. As a note, wheelchair users occasionally had multiple instances of wheelchair damages, but needed to push the airlines to receive their compensation. Additionally, the vouchers often came with a one-year expiry date, which may limit the risk of loss for airlines.

Increased Demand

Implementing a dedicated wheelchair spot is a potential source of revenue for airlines because wheelchair users, as well as their friends and family, will buy more tickets. Based on our survey, 97% of those who have flown with a wheelchair or with a wheelchair user before (111 respondents) would choose to fly more often if there was the option to board a plane in a wheelchair. Further, 35% would fly with another person, 22% would fly with two more people, and 13% would fly with three or more people, not including a caretaker (Figure 2). With 686,000 wheelchairs enplaned in 2019, the number of tickets sold attributed to wheelchair users could increase significantly (McCartney, 2021). Another finding from our survey was that of 23 respondents who have never flown, 35% chose not to due to potential risk of injury, 61% due to risk of damage to the wheelchair, 78% due to the process seeming overwhelming and complicated, and 17% were unable to sit without the aid of their personal chair. The addition of a dedicated wheelchair spot would reduce all of these concerns, increasing ticket sales. In addition,

there were 3.3 million wheelchair users in 2016, increasing by 2 million a year between 2021 to 2028 (Business Wire, 2021). This is due to a general rise in population and use of mobility aids, as well as an increasing geriatric population due to the aging Baby Boomer generation. With the wheelchair market estimated to quadruple, this brings the market from 686,000 to the millions. Overall, there will be opportunities to get existing customers to fly more often, for their friends and family members to fly with them, and to get new wheelchair users to fly, by the addition of a dedicated wheelchair spot on airplanes.

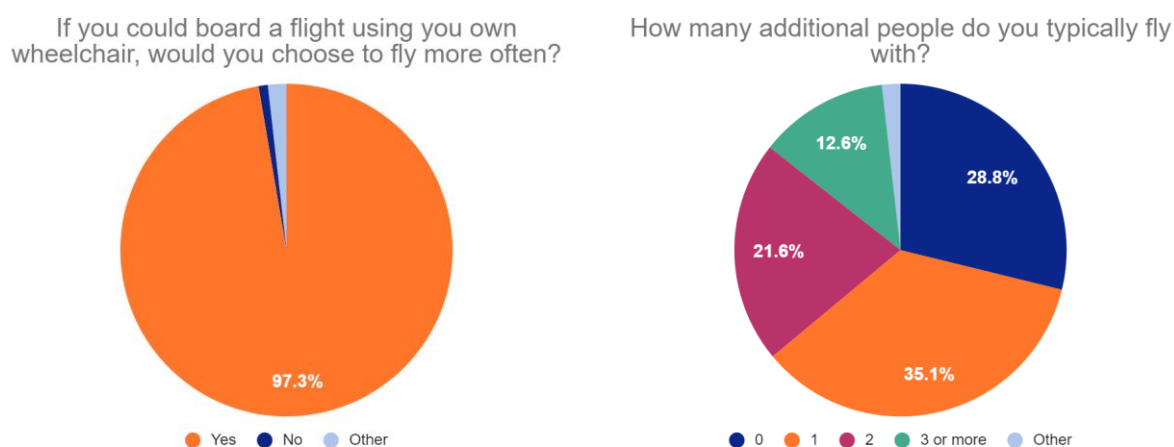


Figure 2. Pie charts showing percentage of wheelchair users who would fly more often, and how many additional people they would fly with a dedicated wheelchair tie down spot

Halo Effect

The halo effect is “the tendency to allow one specific trait or our overall impression of a person, company or product to influence our judgment of their other related traits” (Perera, 2021). Corporate social responsibility (CSR) also plays a part in the halo effect (Hong & Liskovich, 2015). According to Swaen et al., CSR refers to a company’s actions “with respect to their perceived societal obligations” (2021). Customers seem to appreciate and reward company actions that have a positive effect on society, as well as actions that directly benefit them (Swaen et al., 2021). In our survey, we asked, both people who have flown with their wheelchairs or

alongside a wheelchair user and people who have chosen not to for various reasons, what wheelchair accommodations would make them more inclined to fly with a specific airline. As illustrated by Figure 3, 91% of all respondents to the question ranked the option to board using their own wheelchair as their top priority. Being known as a top choice airline for wheelchair-using passengers could be extremely valuable. Customers might hear that an airline has implemented a wheelchair spot, or see a majority of wheelchair users choosing a certain airline, and associate that airline with accessibility initiatives. Because of the halo effect, they might choose to fly with that airline more often, even if they aren't directly affected by the implementation of a wheelchair spot.

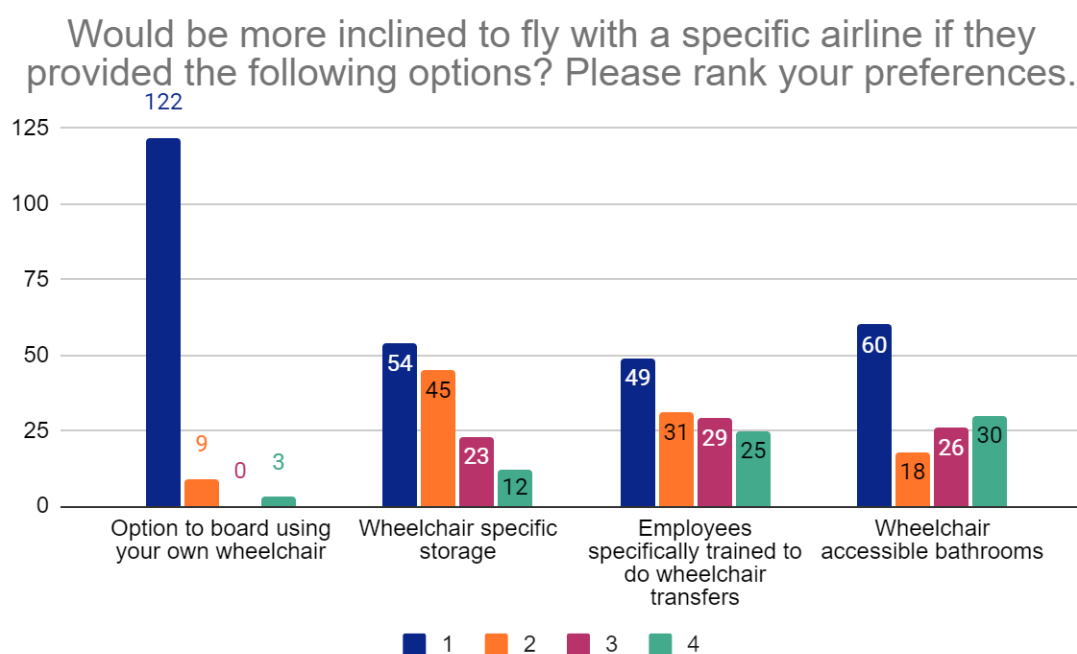


Figure 3. Responses from 134 wheelchair users and caregivers who have flown with or alongside a wheelchair.

Corporate social irresponsibility (CSiR) refers to company actions that are deemed socially unacceptable, and also can contribute to the halo effect (Tench et al., 2012). Considering that customers are “more likely to spread negative than positive information,” CSiR has the potential to quickly outweigh any CSR (Wagner et al., 2008; Swaen et al., 2021). Even if an

airline claims to care about accessibility, with every damaged wheelchair or injured wheelchair user that goes viral on social media, the halo effect comes into play. For example, a video of a wheelchair being damaged, posted by travel blogger Cory Lee, garnered over 321,000 views on Facebook, and a Twitter thread posted by user @YomiWrong about their lost wheelchair gained over 126,000 likes (Lee, 2018; Wrong, 2022). The only way to combat this CSiR, and the negative attention from it, is to prevent it from happening.

Discussion

Overall, we found that airlines can meet the demand of the increasing population of wheelchair users, as well as save money by reducing wheelchair repair costs, reducing risk of worker injury, reducing voucher costs, reducing risk of legal fees, and reducing cost of tarmac time. There are many other potential economic, social, and legal impacts outside of the financial impacts analyzed previously. For example, if the number of wheelchairs damaged on planes decreases, wheelchair repair companies will lose the revenue they would have made by repairing these damages. Additionally, improving accommodations for wheelchair users on planes could have a social impact of better identifying and implementing accommodations for people with disabilities throughout society in general. Finally, there will be a legal need to follow regulatory constraints by the Occupational Safety and Health Administration (OSHA), which regulates the health and safety of workplaces, and the Federal Aviation Administration (FAA), which regulates civil aviation. This affects the responsibility of airlines for workplace injuries, as well as the manufacturers that will need to follow FAA regulations, which could affect the price of implementing the wheelchair securement in the future.

We have a few recommendations to refine the considerations for this paper. First, because our cost of wheelchair repairs is forecasted off of only one year of wheelchair repair data, we would suggest re-running the analysis using wheelchair data from 2022 onward to strengthen estimates. Additionally, we would recommend a more refined estimate for tarmac turn time costs. This would entail conducting time studies for a more precise estimate of the time and the variation of times it takes for a wheelchair user to board and deboard a plane using the current method, and compare it to proposed wheelchair securement methods. Finally, as mentioned previously, the cost of implementation for airlines was outside the scope of our research, but is also an important financial consideration for airlines that should ultimately not be overlooked. We hope this report encourages further research into wheelchair-accessible airplanes so that wheelchair users can enjoy commercial flights safely and comfortably.

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