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Purdue Aviation as a Private Charter

ENGL 42100

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Abstract

Students are faced with the challenge of finding a way home during breaks, this can be expensive, burdensome, and inconvenient. With Purdue having a high rate of international and out of state students flying home, there needs to be a seamless way of getting to the airport where their commercial flight departs from. The purpose of this white paper is to present an alternative method of transporting students to nearby international airports using our own university airport. This report contains detailed research in legality, cost, and asset analysis.

Introduction

The topic of transportation of college students during breaks is often left to the students to decide how they are going to get home. Many decide to simply drive if they have a car, some decide to take a bus to their hometown, and many fly out from international airports including the Indianapolis International Airport (IND) and Chicago O'Hare International Airport (ORD). The problem for those flying out of nearby airports is getting to those airports. There are some solutions to this issue, including taking a public bus or shuttle service, getting a private carrier, or driving themselves to the airports. These all fall short each in their own ways, the bus services don't go directly to the airport, forcing you to find another way from the bus station to the airport and toting your luggage around. While shuttles sometimes go directly to the airport they tend to cost more, in addition to, along with buses, making several stops on the trip. Both shuttles and buses are in general slow, uncomfortable and time consuming. The alternatives are paying exuberant prices for a private ride to the international airport, or stacking daily fees to park your car at the airport. A private flight offered by Purdue would be attractive to students as it is very convenient going from the university airport to the international airport, as well as being very timely, only taking 45 minutes to an hour for each flight. Additionally, a flight being cost efficient in comparison to other direct transportation methods.

Having students find their own way to the airport has always traditionally worked; however, Purdue University is in a unique position where it is ranked fourth in the nation for the number of international students attending the university. Purdue hosts nearly 34,000 undergraduate students while almost half of those are out-of-state or international, both of these stats add up to more students flying home each break. Purdue is also the first university in America to have its own private airport, and to go further we have our own private jet. The combination of all these things leads us to wonder why Purdue has not started regular flights to local international airports for students at the university. This would also benefit Purdue in providing a profit to help cover the maintenance costs of the airport and aircraft. We are presenting this proposition to the university and airport management to give the university the information they need as to the benefits for the management, airport, and the students and how this venture may be possible.

Research Plan

To analyze whether Purdue Aviation serving as a private charter, to transport Purdue students and faculty to and from nearby international airports on semester breaks and holidays, would be beneficial, our team developed a multi-step research plan:

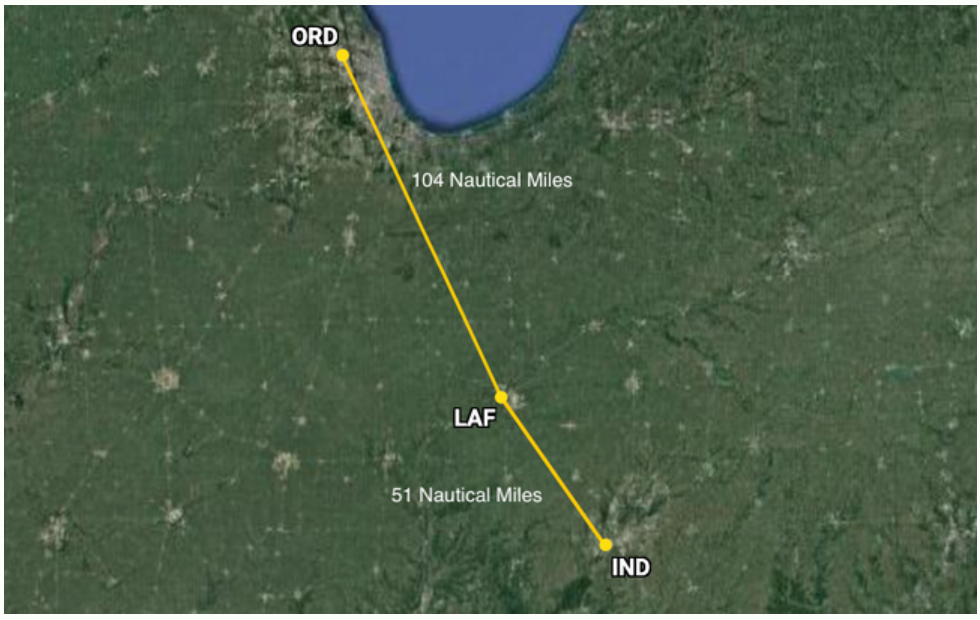
Step 1: Interview Purdue student and Purdue Airport personnel
Step 2: Survey Purdue students
Step 3: Gather background information on the Purdue Airport and it's assets
Step 4: Analyze cost and legal implications of a Purdue commercial charter

Primary Resource Collection

Our primary research consisted of interviewing Purdue University Airport manager, Adam Baxmeyer, to achieve a sense of how plausible this proposition was and if the university had ever done something similar. Additionally, we interviewed a student and conducted a survey to discover the demand from for a private service and how frequently we would need to fly this service in order to be profitable. We sent the survey to a variety of student organizations, via GroupMe and other connections, and as many willing participants as possible, collecting from a wide range of students including local, domestic, and international.

Secondary Resource Collection

The plan for conducting secondary research included educating the team and gathering information on the jets that Purdue currently owns, that could be used in a Purdue Airport charter system, as well as information about potential other assets that could be used for this service. The team also gathered information to help create an analysis of cost and specifications for each jet considered as a solution for our proposed issue. Furthermore, the team collected information about the legal ramifications behind the solutions our team provides in the white paper, and collecting sources regarding other institutions or businesses that provide similar services. This also included researching Purdue's previous status of hosting private airlines that chartered flights to larger airports. The team dug into the Federal Aviation Administration's (FAA) restrictions as well as combing the Department of Transportation (DOT) and National Transportation Safety Board's (NTSB) websites as well for legal restrictions and other hurdles Purdue would be required to comply with.



Flight Path from Purdue to Chicago and Purdue to Indianapolis from GreatCircleMap

Results of Primary Research

Interviews

The primary research provided a more up-to-date and personal indication into the plausibility and desire for private airport chartering at Purdue.

Firstly, the interview with Purdue Airport manager Adam Baxmeyer provided valuable information about the airplane that would potentially be used for the travel, the legality issue of the concept and potential solutions, as well as mentioning the previous precedent that airlines had been chartered before. This is confirmed by a 2004 Purdue Exponent article detailing the reasons airlines left the KLAF airport (Krisel, 2004). Mr. Baxmeyer had this to say about the proposition, "I have never looked into [Purdue as a private charter] much because I have always just wanted an airline to come back to KLAF." Baxmeyer also expressed belief that the venture could be profitable with the right equipment and calculations done. He additionally shared his insight into the legal workaround for the FAA laws restricting transportation for private citizens (FAA Part 135). Baxmeyer also went into detail explaining how it might take a few years to get this operations up and running due solely to logistics, including getting the aircraft transitioned to the proper seating configuration for optimal capacity and training the professors or other airport personnel as captains for the aircraft, since one of the proposed aircraft was only recently donated to the school by the Eli Lilly company.

Next, the interview with a Purdue student provided insight into the opinions and requirements that a student would have when presented with the opportunity for a private charter flight to and from airports. The interviewee expressed their contentment with current charter opportunities offered by Purdue, such as the Reindeer Shuttle. The Reindeer Shuttle offers students a discounted price for transportation to and from airports and campus with detailed pickup times and locations, as well as a consistent price for each trip. With her current dedication and satisfaction with the Reindeer Shuttle, it is important to the interviewee that the value of the Purdue Airport commercial charter is greater than the current transportation options provided by Purdue. The most important factor to consider between current options and the airport charter is price. This is something that was deemed important from the Purdue student survey that was conducted as well.

Results of Primary Research

Student Survey Data

A survey was sent to peers and groups of Purdue students that each of the group members were associated with, as well as any other willing participants from other groups. As such, it has somewhat of a convenience bias, and the sampled students would be better off if more international and out-of-state students were asked. As it stands, the survey data is still a considerable number (n = 52) and provides valuable data on how students travel and use airports, as well as how many would consider using a private charter system.

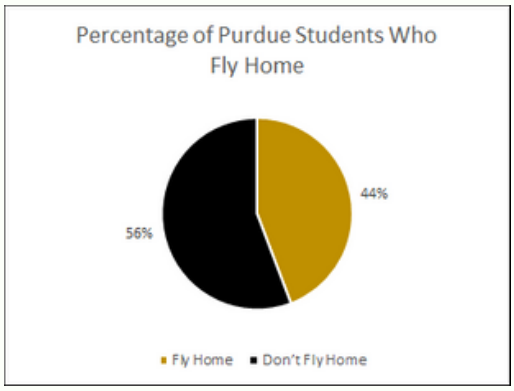


Figure 1: Student response to whether or not they fly home

In Figure 1, the students were asked "Do you typically fly home for breaks and holidays?", and given a choice of yes or no. The results were a tendency to not fly home, but again would likely be much higher with a greater sample size. Even as such, 44% would still be a considerable amount of students who could potentially benefit from the chartered system.

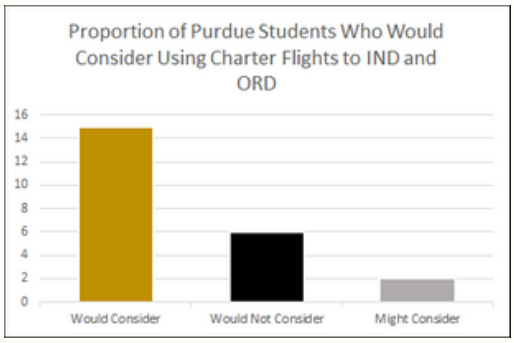


Figure 2: Student response to if they would consider using charter flights

In Figure 2, students were asked "If Purdue were to offer a private charter flight to and from campus to either the Indianapolis or Chicago O'Hare airports for a discounted price, would you consider flying?" A decent majority replied yes, which while it is not an excellent prediction of the potential future usage of students on the charter service, it indicates that many students would prefer flying over shuttle services.

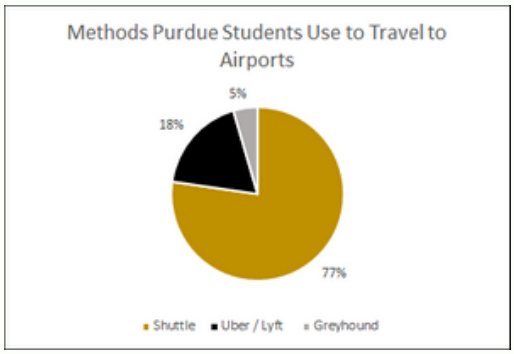


Figure 3: Student response to the methods they used to travel to airports

In Figure 3, the methods that students use to travel to airports was recorded, which gave valuable data for both the status quo travel method, giving a travel system to compare to, as well as providing a basis for pricing comparison between flying and other methods. They were asked "If you fly, how do you typically get to the airport from campus?". With a multitude of different transport options given, the vast majority chose to shuttle.

Results of Primary Research

Student Survey Data Continued

The study also collected more auxiliary data from the students. Figure 4 displays the results of the question asking "How much do you normally spend on travel to and from the airport?", and gave four price ranges as choices. As it stands, the majority of student's travel methods are likely to cost less than ~25 dollars, as the price of a shuttle is not that large. For those who spend a large amount of money, a plane ticket will likely be cheaper in the smaller scale that our team is proposing. This data is some of the most important as cost is incredibly essential to making the charter service viable.

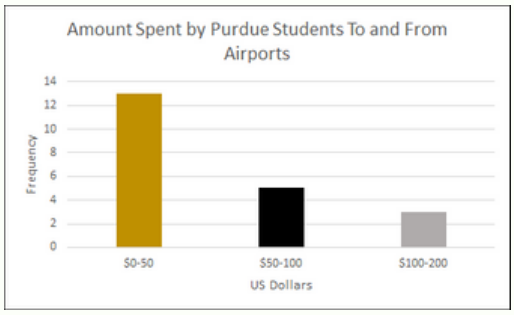


Figure 4: Student response to the amount spent going to and from airports

In Figure 5, the students were asked "If this service were provided, when would you use it? Choose all that apply", and were given the five choices present in the graph. All the breaks actually received a very similar amount of votes. The shortest breaks, Thanksgiving and Fall break, still received 72.7% votes by those surveyed. As expected, the longest breaks of winter and summer had the highest proportion, but this data shows that the charter service is likely to be more than a once or twice a year occasion, and instead could be used for a multitude of situations.

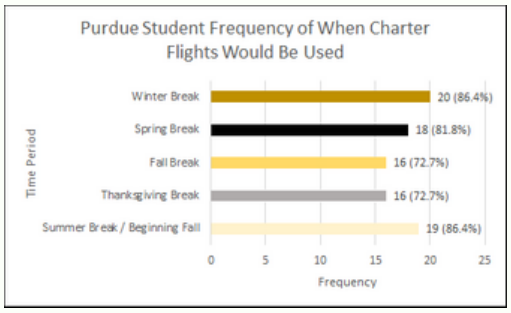


Figure 5: Student response to when they would use these charter flights

Lastly, Figure 6 shows the current situation due to COVID-19, as many people's plans for travel may have changed. The question asked "Did COVID-19 change your plans for flight travel to or from campus this year?", with a yes or no answer option. While not extremely pertinent to the paper's proposals, the data is helpful for getting a gauge on whether or not COVID would affect the proposal's numbers and travel situation.

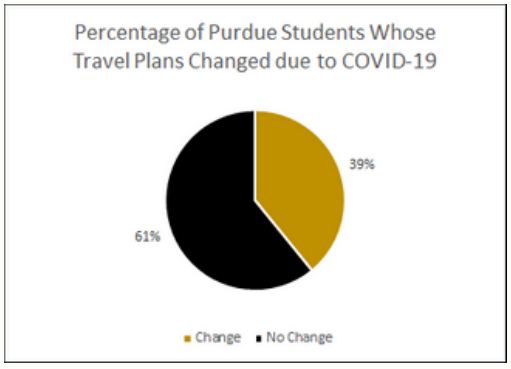
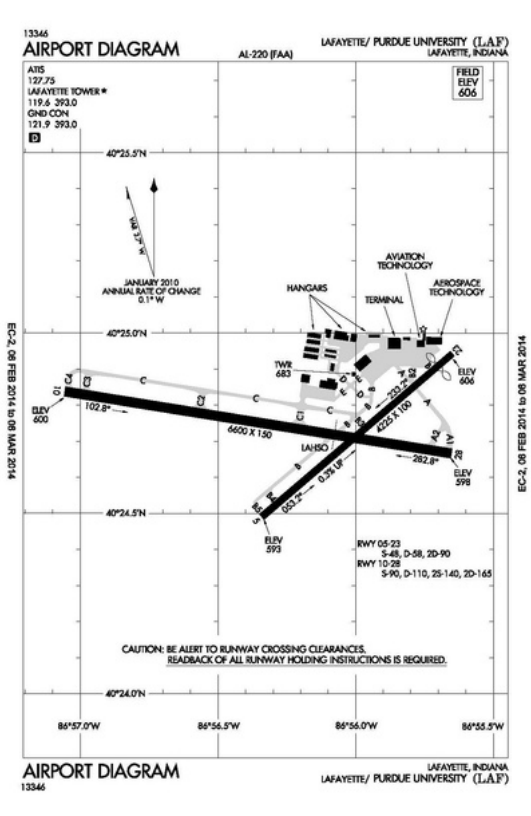


Figure 6: Student response to whether COVID changed travel plans

Results of Secondary Research

Airport Data

Purdue's airport has several key factors that determine whether the private chartering proposal is feasible. It is the second busiest airport in Indiana, recording over 97,000 aviation operations annually (Purdue Aviation, 2020). The distance from Purdue's Airport (KLAF) to Chicago's O'Hare International Airport (ORD) is 104 nautical miles, and the distance to Indianapolis International Airport (IND) is 51 nautical miles (GreatCircleMap, 2020). The estimated times to fly to these airports using the Purdue's Gulfstream GIV-SP aircraft is around 47 minutes for ORD and 37 minutes for IND (TravelMath, 2020).



Purdue University Airport (KLAF) diagram from the AOPA

The Purdue Airport has a storied history with private airlines using it to fly students and faculty. This included American Airlines, Midway Airlines, and US Airways. The last airline left Purdue in 2004 due to the inability to fully seat the aircraft, however, those airlines were charging significantly higher prices than Purdue Aviation would be (Krisel, 2004). There has also been some support for commercial airplanes to come back, including by the current Purdue Airport Manager Adam Baxmeyer (Spohr, 2017).

Purdue University Airport (KLAF) image from airport-data.com

Results of Secondary Research

Purdue Aircraft and Assets Analysis

Purdue Airport's various assets were researched in order to find what resources Purdue has in terms of staffing and equipment. While Purdue has a multitude of airplanes available for rental and training (Purdue Aviation, 2020), there were only a few planes that served the purpose for the private charter. The decided upon planes to consider were the Purdue owned Gulfstream GIV-SP and, to cut down on fuel costs, an unowned DHC-6 Twin Otter. The Gulfstream GIV-SP seats 19 passengers and has a cruise speed of 882 km/h. The DHC-6 Twin Otter seats 20 passengers and has a cruise speed of 270 km/h. Due to the slower speed, the propeller Twin Otter takes an estimated 51 minutes while the Gulfstream takes around 37 minutes to travel to IND (TravelMath, 2020).

In other assets, Purdue has a passenger terminal building, which served as the terminal for previous airlines, equipped with two airline gates. It has a concourse and baggage claim, and is used for chartered Purdue Sports flights. The airline has two runways, approach aiding lighting systems, and seven hangars for private and corporate aircraft (USDT FAA, 2020). All of this information is important to the functioning of the airport at Purdue, and ensures that the charter flight proposal wouldn't require much else besides the aircraft and fuel costs, as well as crew costs. Purdue is consistently rated as a top aviation university with phenomenal resources at our disposal and it is a shame that we are not using these assets to help our students when it additionally benefits the university.

Purdue Universities Gulfstream IV from Jetphotos.com

Results of Secondary Research

Cost Analysis

To properly assess the feasibility of running these private flights research was done into the costs associated with a commercial flight. Some expenses were not included as they were already covered for the Purdue airport as part of the aviation program. The expenses researched were those directly related to the proposed flights to transfer students from the Purdue airport to the Indianapolis airport. The first step of cost analysis was for the cost of fuel needed to perform this flight. This cost has to include enough fuel for takeoff, flight time and landing, as well as repeating the process to return the aircraft to the Purdue airport. The amount of fuel required to perform a flight is dependent on the flight time and the fuel burn rate of the aircraft. As there are two penitential aircraft being discussed, research had to be done on the characteristics on each aircraft, as well as how to perform aircraft fuel calculations. The Gulfstream has a fuel burn rate of 464 gallons of fuel per hour and could complete the flight in approximately 37 Minutes (JetStream, 2020). Research showed that prior to the massive drop of oil price from covid, the cost of jet fuel was about $1.708 per gallon. With this information it was calculated that the cost required per tickets to pay off the cost of fuel for the trip would be approximately $51.44 per ticket, the calculations were performed as shown below.

37min/60min * 464gal/hr * $1.708/gal = 488.72 per trip (one way)
$977.44 to cover fuel for round trip
$977.44/19 passengers per trip = 51.44 per ticket to cover fuel costs.

This process was repeated for the de Havilland DHC-6 Twin Otter. The twin otter has a fuel consumption rate a 468.2 pounds per hour. The previously stated fuel cost what is converted to match the consumption rates and was found to be $0.295/lb. The twin otter has a lower cruising speed than the Gulfstream, so it would take about 51 minutes to complete the flight (TravelMath, 2020). Using this information to repeat the calculations above, the average cost for a round flight in the Twin Otter is $234.8 total. Divided among the 20 passengers that it can carry, it came to an average fuel fee of $11.74 per person.

Results of Secondary Research

Cost Analysis Continued

The next topic researched was the cost of a pilot to fly the plane back and forth. Commercial flights require that the plane has a captain and copilot to fly the aircraft. Research shows that most pilots are paid hourly by flight time with an average hourly rate of $30/hour. For the Gulfstream's travel time of 37 minutes, that's an average fee of $74 or 3.89 per passenger. For the Twin Otter average flight time of 51 minutes, that's an average fee of $102 or $5.10 per person. In the US, commercial flights are required to have a flight attendant for every 50 passengers, but neither plane holds more than 50, so only one flight attendant would be required. Flight attendants' salaries work similar to a pilot with an average hourly rate of $25. That's an average pay of $30.83 per flight for the Gulfstream or $42.50 per flight for the Twin Otter. Overall, that comes out to a total crew cost of $104.83 per flight for the Gulfstream and $144.50 per flight for the Twin Otter. That increases the cost of tickets by $5.52 and $7.23 per passenger for the Gulfstream and the Twin Otter respectively.

Additionally, we would be force to tack on fees to upkeep the conditions of the university airport terminal and other maintenance for the aircraft, however, these would be minimal and probably kept around $15 per ticket.

Unfortunately, we do not currently own a de Havilland DHC-6 Twin Otter plane, and would have to purchase one new, for $6.5 million dollars, or used, for roughly $2.5 million (Controller, 2020). This would come out to an average of $40 per ticket, in which case we would pay off the aircraft in about 30 years. This number is great, considering the number of hours we would be putting on it, additionally, the university would still be able to resell the asset at any point and receive our money back without any issue.

de Havilland Canada DHC-6 Twin Otter image from Zimex.com

Results of Secondary Research

Legal Implications and Analysis

As a result of our secondary research, with some additional help from primary research, we have discovered how we might legally go about using Purdue Aviation as a private carrier, to charter students and faculty of Purdue University to and from nearby international airports. The Aircraft Owners and Pilots Association (AOPA) recently published an article written by Alysia Cobb going into detail how the Federal Aviation Administration (FAA) is cracking down on illegal private chartering cases, with steep fines, ever since the Reauthorization Act of 2018 from the FAA (Cobb, 2019). Therefore, we want to take every step to ensure that we are within the confines of the regulations set forth by the FAA.

After thoroughly combing through the FAA, NTSB, and DOT websites we have discovered that according to FAA Federal Regulations Title 14, Chapter 1, Part 91, 135, and 136, we are within these regulations, and any set by the DOT and NTSB, if we have insurance and each passenger sign a waiver stating liabilities are under the individual and not the pilot or carrier (FAA, 2020). Additionally, giving the university and pilots authority over the passengers when on the aircraft.

Furthermore, we must conduct ourselves as any other airline with trained pilots, who have earned a proper amount of training in the aircraft, airworthy aircraft, sufficient schedule, and crew available.

When we conduct all of these things in a professional manner and abide by other regulations set forward mainly by the FAA for an airline there is no other reasons that we cannot conduct Purdue Aviation as a private carrier for students and faculty of Purdue University.

Possible Solutions

When faced with the issue of needing a convenient, cost effective, and fast method of getting students to nearby international airports there is few solutions rivaling flight. With shuttles and buses, you have to haul your luggage around with you and may not have ideal pick up or drop off locations, additionally forcing you to stand outdoors waiting for the mode of transportation to arrive. These methods are slow, making stops along the way to pick up other passengers and to refuel. Shuttles and buses take on average 3 plus hours to get from the Purdue Memorial Union to the Chicago O'Hare International Airport (Reindeer Shuttle, 2020), whereas the flight would take 45 minutes, a fraction of the time. An alternative is the very expensive private ground charter using methods such as Uber or Lyft to transport you, and while these methods are increasingly convenient, they are slower than flying, by again about 1.5 hours, additionally reaching prices of $149 to $321.

The best possible solution to these problems of ground travel is to fly, through our research and calculations we estimate that tickets for a flight from KLAF to IND would be priced roughly around $75 per ticket and $87 per ticket to ORD. This price point takes into account fuel, flight crew, airport upkeep, and aircraft maintenance costs, additionally the possibility of needing to make aircraft payments.

Not only is this cost effective for students but it fulfills the wish of airport manager Adam Baxmeyer of having a commercial airline flight out of the KLAF airport again. Previous airlines left the airport because they were unable to fill seats, we heavily attribute this to the cost of their tickets, which were around $250 (Krisel, 2004). This proposal shows that the demand is at Purdue, during peak seasons, and that at the right price point seats would fill if offered a limited number of flights in peak seasons. Our research has estimated that an ideal number of flights is around 20 flights per break, for example, 20 flights for those leaving campus during winter break and 20 flights when returning from winter break, offering 400 tickets at each interval. Considering Purdue University hosts close to 34,000 undergraduate students it would not be hard for us to sell 400 tickets at each break interval.

Conclusion

After extensive primary and secondary research, the team's hypothesis that Purdue Airport offering charter flights would be profitable and beneficial to students proved to be true. The team's comprehensive research plan laid the groundwork to establish a well-supported conclusion. Primary research in the forms of interviews and student survey data found beneficial information in terms of legality and the potential efficacy and scale that the charter flights would operate at. With secondary research, the team analyzed the Purdue Airport's status-quo situation, including important data for traveling to international airports and the current assets that Purdue possesses and could be used for this charter system. The main issues at play, cost and legality, were both researched thoroughly as well to ensure that the plan was both profitable and legally feasible.

As previously stated, analyzing the cost of both the Gulfstream and Twin Otter showed a possible venue for students to take a more convenient, comfortable, and faster method of travel in exchange for a moderate price. In addition, while legality at first glance did not look possible, through further research and interviewing, several different methods of legally using private charters were found. Totaled with the already well equipped airport and willing Purdue students, the team's private charter proposal is deemed to be both possible and beneficial to Purdue University and its students. Due to the the cumulative implications of the research done, the team has proposed a solution to consider that would be both financially and legally attainable.

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