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Comparison of Airline Co-Branded Credit Card Programs via Frequent Flyer Money Saver Analysis for Full-Service U.S. Carriers

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By

Bora Suavi Unsal

A Dissertation Submitted to the College of Business
in Partial Fulfillment of the Requirements for the Degree of
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via
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This Dissertation was prepared under the direction of Dr. Scott C. Ambrose, , the candidate's Dissertation Committee Chair, and has been approved by the members of the dissertation committee. It was submitted to the College of Business and was accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy in Aviation Business Administration

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ABSTRACT

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Title: Comparison of Airline Co-Branded Credit Card Programs via Frequent Flyer Money Saver Analysis for Full-Service U.S. Carriers

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Although airline alliances work fairly effectively for paid flight segments, passengers who want to redeem frequent flyer miles often encounter difficulties. Sometimes airlines demand an extensive amount of air miles to book requests for award seats to not only their partner airline customers but also their own customers. Furthermore, while the airline co-branded credit card award mile earnings and redemption rates fluctuate significantly between different airlines, passengers are not well informed about which airline co-branded credit card requires the minimum amount of credit card expenditure to fly with an award ticket to their desired travel destination.

A more useful and practical system is necessary to fulfill passenger's expectations to overcome the problems associated with earning and redeeming frequent flyer miles on flights via airline co-branded credit cards. Grounded in consumerism theory, this research acknowledges that buyers, relative to sellers, often lack important information as they seek to make purchases. As such, efforts to help consumers make more informed choices benefit not only consumers but also the wider marketplace.

In the first part of this research, a quantitative model called the frequent flyer money saver (FFMS) analysis was used to compare the official credit cards offered by the leading carriers' loyalty programs operating in the United States via simulation. In the second part, an exploratory structural equation model (SEM) was used to determine the FFMS ratio's factors based on the route characteristics.

According to the results, United Airlines outperformed other airlines in terms of FFMS ratio distribution, whereas Hawaiian Airlines held the lowest position. Regarding the SEM results, the route characteristics including market share and number of passengers carried were negatively associated with the FFMS ratio.

Based on this dissertation's findings, when compared with Hawaiian and Alaska Airlines, the members of big three airlines (Delta, American and United) offer significantly higher savings in aggregate to their customers with respect to redeeming miles for an award ticket. Tentative findings also suggest a potential relationship between route characteristics and the FFMS ratio that should be further explored.

Key Words: frequent flyer miles, aviation credit cards, award miles, frequent flyer credit cards, FFMS

DEDICATION

I dedicate this dissertation effort to my family members, whose support helped me overcome every obstacle in my entire life.

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List of Acronyms

AA = American Airlines

AGIFORS = Airline Group of International Federation of Research Societies

ANAHEI =Association of North America Higher Education International

AS = Alaska Airlines

ASM = Available Seat Mile

ATRS = Air Transport Research Societies

CASM = Cost of Available Seat Mile

DL = Delta Air Lines

EMFR= Expected Marginal Frequent Flyer Money Saver Return

EMSR = Expected Marginal Seat Revenue

FSC = Full-Service Carrier

FFMS = Frequent Flyer Money Saver Analysis

GAAP = Generally Accepted Accounting Principles

HA = Hawaiian Airlines

HTMT = Heterotrait - Monotrait Ratio

IATA = International Air Transport Association

IFRIC 13 = International Financial Reporting Interpretations Committee Standard 13

IFRS = International reporting financial standards

LCC = Low-Cost Carrier

MLE = Maximum Likelihood Estimator

UA = United Airlines

USD = United States Dollars

ULCC = Ultra-Low-Cost Carrier

PLS = Partial Least Square

RPK = Revenue Passenger Kilometer

SEM = Structural Equation Model

WCTRS = World Conference on Transport Research Societies

CHAPTER I
Introduction

Since the 1978 U.S. Airline Deregulation Act, many airlines have started programs designed to encourage customers to accumulate frequent flyer program miles that can be redeemed for free air travel or other rewards. In 1979, Texas International Airlines started the first frequent flyer program to keep track of their most loyal passengers and ensure that they use the airline continuously.

Following Texas International, in 1981, American Airlines started its frequent flyer program called AAdvantage. Through the loyalty program, American Airlines determined its most loyal customers, to whom it offered special pricing and additional services. Today, the AAdvantage program offers many ways for members to use the miles they accumulate, and the AAdvantage program catalog even offers products from numerous stores that can be purchased using the miles. According to Elliot (2016), 630 million members have been enrolled in 81 different airline loyalty programs (including all members of the Star Alliance, SkyTeam, or OneWorld strategic alliances) worldwide, but those members lost a cumulative 1 trillion award miles due to time limits for each airline over the past five years. To overcome this problem, most of the major airlines canceled time limits for air miles. However, the airlines did not provide any information on whether canceling the time limitation of air miles positively or negatively affected their financial results.

Many airlines have loyalty programs designed to encourage their customers to accumulate frequent flyer miles, which may then be redeemed for air travel or other rewards. Vinod (2011) noted that “Loyalty is not only just a program, but also a framework to reward and retain profitable customers to help them become loyal repeat customers.” Miles earned for an airline loyalty program may be based on the class of fare, distance flown on that airline or its alliance code-share partners, or the fare paid. Also, other ways to earn points often exist. For example, in recent years, it seems that more airline miles have been earned using co-branded credit and debit cards than by air travel. Another way to earn airline miles is by spending money at associated retail outlets, car rental companies, hotels, or other associated businesses. Airline miles can be redeemed for air travel, travel class upgrades, airport lounge access, priority bookings, and other goods or services.

According to the European Central Bank (2012), frequent flyer programs can be seen as a specific type of virtual currency, one with the unidirectional flow of money to purchase points, but no exchange back into real-world currency. Today, airline passengers can purchase nearly anything money can buy with their virtual currency. However, it is true that they cannot exchange their miles for a cashback option despite the airlines declaring the outstanding miles owed to customers as a liability on their balance sheets.

Regarding Unsal (2019), one of the most useful ways of earning miles is using airline co-branded credit cards promoted by airline–bank partnerships. Originally, airline frequent flyer programs gave reward miles to their customers when they flew one of the airline’s predetermined routes or fares. In the following years, the programs enlarged to include airline–hotel and airline–car rental company relationships, where customers could earn additional miles by making purchases from these partners. However, all these ways of earning miles are limited because customers only fly, stay in a hotel, or rent a car for a certain amount of time. Therefore, the only way to earn airline miles daily is to use airline co-branded credit cards. When customers use these credit cards, they can collect airline miles every time they make a credit card purchase. Turkish Airlines (2018) stated that they awarded more than one trillion airline miles to airline–bank co-branded credit cardholders in 2017.

In this study, Frequent Flyer Money Saver Analysis (FFMS) was used to compare airline co-branded credit card programs, because as people often use credit cards multiple times daily, these co-branded cards are the most common way to earn airline miles. The airline's frequent flyer programs promise a great variety of free services. However, in reality, customers face problems using these services. One problem is that as the number of loyalty program members increases, the availability of certain awards diminishes, including free seats on flights (Turkish Airlines, 2018). According to Brunger (2013), airline revenue management divisions view free seats reserved for frequent flyer customers as a liability; therefore, the number of available award seats is limited. Hence, customers sometimes cannot fly free, no matter how many frequent flyer miles they have earned. The situation worsens when passengers need to book flights on partner airlines within their program's alliance. Most airlines prefer to reserve their free upper-class seats for their own frequent flyer program customers.

Another problem related to frequent flyer programs is the exchange rate of frequent flyer miles to other services proposed by airline partner companies. Unsal (2018) provided a numerical example about the exchange rate of miles as follows: "If you want to use your miles to upgrade your tickets, you can use 10,000 miles for $85; however, if you use your miles to purchase goods from a store, you can cash in 10,000 miles for $5". Dostov and Shust (2014) argued that no one surveys frequent flyer mile transactions globally, and that countries require different accounting models and have varying regulations for the way airlines must convey their frequent flyer information to the public. However, most times, no one controls frequent flyer program mile earnings, and airline companies put in place whatever rules and regulations they think will maximize their shareholder benefits. Dostov and Shust (2014) stated, "In reality, uncontrolled frequent flyer programs and exchange rates violate customers' rights."

Although most of the cited scholarly publications on the airline industry in the literature review section focus on qualitative research about increasing customer loyalty for specific airlines by adopting frequent flyer programs, a gap exists in the literature about comparing different frequent flyer programs by analyzing savings related to official credit card expenditures. The previous studies discussed in the literature review section focused on calculating the value of an airline mile in general. So, it is still unclear whether spending with an airline-promoted credit card offers significant savings or not, and whether a significant difference exists between airline programs. In the marketing of airline co-branded credit cards, customers should be informed about how much they will save for future award ticket purchases when they are using these cards and whether 5% or 40% of their daily expenditure on the card can be used to buy a future airline award ticket. Therefore, this dissertation seeks to provide more transparency to consumers about which co-branded credit card programs can offer them the best value for award tickets.

The frequent flyer money saver (FFMS) analysis was first introduced by Unsal (2018), and in its first implementation, the author tried to determine if a single quantitative approach can be used for the International Air Transport Association (IATA) or other airline alliances to create internationally regulated airline mile earnings and redemption procedures. According to feedback obtained at the Airline Group of the International Federation of Operational Research Society conference in 2018, some of the airlines are very interested in re-regulating their frequent flyer programs to give more rewards to their clients, while others do not support international regulations. Thus, it becomes evident that no central authority will regulate frequent flyer programs in the near term.

For the scope of this study, the United States was primarily selected because it has five different full service carriers, which operate both on domestic and international routes. Furthermore, the customer profile of full-service carriers is roughly the same. Any U.S. resident can apply for the airline-co-branded credit cards that they think best suits them. Unsal's (2019) prior study, conducted on airlines in the European market that related to FFMS analysis, concluded that increasing the number of reserved frequent flyer program seats on selected flights significantly increases the savings for loyalty program members. Conversely, as the weekly frequency of flights between two destinations increases, savings from loyalty programs decreases. The study was mainly weakened by the data on airline ticket prices obtained from airline ticket reservation systems, which did not include seasonal ticket price fluctuations. Therefore, the study results provide only an estimation of the total system, not a route-by-route comparison.

Compared to the results obtained from Unsal's (2019) study, the distinction between this dissertation to the existing literature (Winship, 2011; Basumallick, Ozdaryal, and Madamba-Brown, 2013; Sorensen, 2013) is that, rather than using a single ticket price for a specific route, all the ticket price distributions in this study will be obtained using the Sabre Marketing Intelligence database. In the first section of the dissertation, after obtaining ticket price and the required credit card expenditure data, the FFMS ratio can be calculated for each of the airlines that fly our selected route via Risk simulation software. As a result of the simulation, all the observed airlines will be compared with their competitors. The results of the simulation can help airline customers decide the airline loyalty program that provides the maximum savings ratio for their desired travel route(s).

In the second part, the factors related to the frequent flyer program of each selected airline were researched by applying a structural equation model to gain a deeper understanding of the working function of the FFMS ratio on airline market share and the number of carried passengers. In this structural equation model, path coefficients between route specifications and the frequent flyer program specification were analyzed for the period between the first quarter of 2016 and the last quarter of 2019 (a total of 16 quarters).

A SEM model was mainly included to help us better determine the nature of the underlying relationships between FFMS results obtained in the first part of the dissertation with route specification. The main contribution of the SEM model is to begin to understand drivers of the FFMS ratio. With a better understanding of drivers at the route level that can impact the FFMS ratio either positively or negatively, consumers will ultimately be in a position to make a more informed choice regarding which airline co-branded credit card can offer them the most value.

Based on the simulation results, it was found that the big three airlines' credit card programs (American, Delta and United Airlines) offer significantly higher FFMS returns to their customers. According to calculations based on Section 6.1, while the minimum FFMS ratio distribution was obtained for Hawaiian Airlines, its maximum was obtained for United Airlines. The FFMS ratio calculated for United Airlines was approximately seven times higher than for Hawaiian Airlines, with a maximum ratio of 13.20%. Based on the simulation graphic comparisons, credit card holders of the smaller-scale airlines involved in the study were advised to change their credit cards to the big three carriers.

Regarding the research findings for the SEM model, all valid models' path coefficients among route structure and FFMS ratio were found to be negative. It was assumed that this negativity may be related with demand theory. Regarding demand theory, as the passenger numbers and market share of a selected airline increase, the ticket price decreases. Therefore, the path coefficient between passenger numbers and the FFMS ratio was considered negative. Hence, a negative coefficient is expected in all valid models because ticket price is the main variable of the FFMS ratio. So, an increase in the demand lowers the FFMS returns.

The validity of the SEM results were also controlled in MIA for verification. The selection of MIA is related to its location. Miami is a large international spot for leisure travel. Millions of tourists visit this airport each year. As the award seats are generally redeemed for leisure travel, selection of the Miami airport is a suitable choice in this research. In this controlled context, the demand and number of carried passengers lowers the FFMS ratio.

This dissertation is organized as follows: Chapter II contains a detailed literature review regarding all aspects of frequent flyer programs. This section includes an evaluation of the programs and scientific research for the different programs. Chapter III gives information regarding airline selection for the study, including financial data for each specific airline, and Chapter IV discusses the methodology of the proposed dissertation. Chapter V includes information about the collection of data, and Chapter VI provides results obtained from FFMS simulation and SEM modeling. Lastly, Chapter VII offers general conclusions and Chapter VIII provides information about the limitations of this research and future research possibilities.

Chapter II
Airline Loyalty Programs

2.1 The Concept of Airline Loyalty Programs

After deregulating the airline industry in the continental United States through the Airline Deregulation Act of 1978, competition among airlines became significant. Gilbert (1996) stated that Southwest was the first airline to have an airline loyalty program. Beginning in the early 1970s, customers of Southwest Airlines could collect a certain number of stamps to get a free flight.

Subsequently in 1981, American Airlines became the first major airline to start a frequent flyer program—called the AAdvantage program. Thus, AAdvantage program is often credited as the first major full-service airline to have a frequent flyer program. According to Petersen (2001), the main idea behind the first frequent flyer programs was to reward frequent travelers with a free ticket once they collected a certain number of airline miles on paid flights. According to Mason and Barker (1996), starting from the year 1982, airlines quickly adopted an idea from the hotel industry of rewarding customers for their loyalty and promoting different elite membership statuses to their customers.

According to Lederman (2007), American Airlines' frequent flyer program was the first one in which the airline used a computer-based ticketing system to track passenger records of flights. Just a short time after American Airlines announced the AAdvantage program, all of their competitor airlines started promoting their own frequent flyer programs. Mason and Barker (1996) stated that the most important achievement of frequent flyer programs was when Continental Airlines implemented its Flight Bank Program and offered bonus points to their customers if they booked their travel using a Carte Blanche credit card.

Levine (1987) stated that after the first implementation of the airline frequentflyer programs, both civil aviation reporters and academic researchers gave only limited attention to these programs. However, by 1986, it became clear that frequent flyer programs played an essential role in airline competition. Gilbert (1996) noted that, by the end of 1986, 24 out of 27 U.S.-based airlines had frequent flyer programs. Browne, Toh, and Hu (1995) called frequent flyer programs the most successful business strategy and innovative marketing application in the history of airline management.

Since their implementation, frequent flyer programs have continuously evolved, and Table A1 in the Appendix shows the historical development of U.S.-based airline loyalty programs.

2.1.1 The Current Trend in Airline Loyalty Programs

It has now been more than 40 years since the implementation of the first frequent flyer programs. During these years, the programs have become more complex, and nearly every airline has its own rewards program so that passengers can earn additional miles from other sectors—hotels, car rentals, insurance, education, private clinics and hospitals, restaurants, and more. Capizzi and Ferguson (2005) stated that loyalty programs in the airline industry have reached the maturity stage. Generally, although most service sector segments offer some sort of loyalty program to keep their customers within their portfolio, are these programs serving their purpose effectively? Referring to the COLLOQUY census regarding U.S.-based loyalty programs, Berry (2015) stated that while many people are enrolled in various loyalty programs, they are inactive in about 60% of them. According to Berry (2015), the total number of U.S.-based frequent flyer members decreased unprecedentedly by 4% in 2015 compared to 2014.

Although the total number of frequent flyer customers may seem to be a good indicator of the loyal passenger volume in the industry, in reality, these numbers do not tell us much about the effectiveness of airline frequent flyer programs. Today, everyone can enroll in a frequent flyer program by simply filling out a form easily within an aircraft. Thus, the relevancy of frequent flyer programs can only be measured by one of these three different indicators: the share of award travel in total seat revenue, the revenue generation of frequent flyer passengers, and the financial gain of the frequent flyer programs, all of which are explained in detail in the next three sections.

2.1.2 Frequent Flyer Rewards as a Share of Total Passenger Mile Revenue

According to global airline frequent flyer schemes and due to legal reporting standards, the source of airline loyalty programs retrievable by the public is carriers operating within the continental United States. Considering each individual airline loyalty program, according to United (2019), approximately 5.6 million and 5.4 million MileagePlus flight awards were used on United in 2018 and 2017, respectively. These awards represented 7.1% and 7.5% of United’s total passenger miles’ revenue in 2018 and 2017, respectively. Total miles redeemed for flights on United in 2018, including all types of award tickets and flight class upgrades, represented approximately 86% of the total miles redeemed. Also, excluding miles redeemed for flights on United, MileagePlus members redeemed miles for approximately 2.4 million other awards in 2018, compared to 2.3 million other awards in 2017. These awards included United Club memberships, car and hotel awards, merchandise, and flights on other air carriers. Regarding small-scale airlines with limited routes and service capacities, the percentage of award miles flown can be expected to be lower, but they would still have significantly impacted the airlines.

2.1.3 Revenue Generation Effect

Another metric relevant to airline frequent flyer programs is the share of passenger revenues, which is attributable to members of frequent flyer programs. This metric is important for the airline because selling products and services to the members of their particular program instead of to non-members offers the airline the possibility to better track and understand its most loyal customers' behaviors and intentions. The airlines that offer several classes of flight can apply those insights for various purposes, including pricing and revenue management. Also, the pool of frequent flyer's tends to present a more stable and less price sensitive group of customers compared to the general public. A study by Vasigh, Fleming, and Tacker (2016) found that, over the study's time scale, the members of frequent flyer programs were less elastic to price changes. According to Air France–KLM, 55% of revenue is realized with loyalty program customers—this includes members of the Flying Blue program and those whose companies have a corporate contract with the Air France–KLM Group (Air France–KLM Group, 2020a).

2.1.4 Financial Contribution

Airline frequent flyer programs are an effective source for generating continuous cash flow for any particular airline. The idea behind cash flow depends on bilateral agreements between airlines and other partner service providers, such as banks and hotel groups. For example, when a customer transacts with an airline co-branded credit card, it enables them to collect airline miles, and the bank sends a commission to the airline to credit the customer mileage account. Likewise, when customers stay in partner hotels, they receive additional airline miles, and the hotel brands send a cash amount to the airline. The system works the same for rental cars. So frequent flyer program partners, in particular, generate a significant amount of cash for an airline, even if the airline does not generate any expense.

Perez (2004) noted that co-branded credit card partners have provided financing to airlines to secure the survival of the airline. Delta Air Lines, for example, received a prepayment of $500 million from the American Express for SkyMiles points in 2004. At the time, Delta was struggling with bankruptcy. Similarly, according to Baer (2009), American Airlines agreed with Citigroup, the airline's co-brand credit card partner, on the advance sale of miles totaling $1 billion. According to Swaffield (2010), airline co-branded credit card users generate a stable income source for airlines that are unaffected by seasonal economic fluctuations. Although these co-branded credit card users may not necessarily be flying frequently within the airline global network, it is really the daily spending on cards that takes away seasonality.

Today, the cash flow from airline partners is worth billions of dollars of income for airlines. Therefore, this study primarily aims to provide scientific evidence to the public that will inform them about the importance of airline co-branded credit card partnerships in which customers can save money on air travel and airlines can generate a significant amount of cash flow.

2.1.5 The Special Case for Airline Loyalty

When airline loyalty programs started in the late 20th century, they became pioneers in loyalty marketing strategies. Instead of considering frequent flyer programs as simple marketing tools, airlines considered these programs significantly because a significant amount of cash flow was generated from them. However, what makes frequent flyer programs the most successful marketing strategy for an airline?

According to de Boer (2018), airline program rewards represent a very high value to airline customers but cost very little for the airline—a unique characteristic of airline loyalty programs. Even if the car rental and hospitality sec tors were to provide similar rewards, they could not spark the imagination of customers the way a free flight can. Some other travel providers can generate discounted ticket options, but they do not compete with the airline loyalty programs because only the airline loyalty programs can provide free business class or first-class tickets to customers who are normally unable to purchase those classes of service with paid tickets. Because of this allure, according to Dekay, Toh, and Raven (2009), airline loyalty programs have more members than any other loyalty program globally.

A study by Kozik (2017) revealed that the closest equivalent to a frequent flyer program is a hotel loyalty program. Hotel loyalty programs provide travel awards, combining high perceived value with a potentially low true cost, such as upgrading to suites with a free breakfast. They also offer status tiers, such as airlines, with rich benefits attached to them. One difference between airline and hotel brands is that most hotels are operated by franchising agreements, so the quality of the service and the comfort of the properties can differ quite significantly. Consequently, customers cannot share a standard experience, which they do get with airlines.

According to Sahadevan (2010), another advantage of frequent flyer programs is that they allow airlines to sell the surplus inventory of luxury seats on their aircraft without any additional cost. In airline economics, not all seats are sold for every flight, which causes a surplus of seats for the airline. Although Vasigh et al. (2016) noted that airlines need to sell excess numbers of seats to guarantee a full cabin, even if an airline sells excess seats, filling the luxury class seats entirely with paid tickets is problematic for most airlines. In this instance, frequent flyer programs provide a unique solution for the airline and come at a lower cost because when the airline sells a premium seat in exchange for airline miles, it removes a financial obligation to the passenger. In return, they often win a happy passenger who is very satisfied with the premium service.

Furthermore, in some programs, such as the Delta–Air France–KLM partnership, some passengers can get a free upgrade when a seat is not filled during the embarkation process if they have the top-tier status of the airline's loyalty program. This means that airlines are successfully managing this system, and particularly with top-tier members, the airlines often provide some other privileged services, such as airport lounge access, priority boarding, and extra baggage allowances.

2.1.6 Loyalty Programs and the Airline Industry

Since the implementation of loyalty programs in the 1980s, several changes have occurred in the airline industry. These include the emergence of low-cost carriers; impact of the Internet on distribution channels; enhanced customer interactions online; emergence of Gulf state carriers; impact on international markets since the early 1990s of progressive liberalization of policies, including the U.S. open skies policy; and arrival of new aircraft, such as double-decker planes and long-range fuel saving planes that can fly extensive long-range routes. However, the greatest achievement can be seen in the growth of the number of passengers served.

In a 2011 study of the airline industry commissioned by IATA, Michael Porter, a professor at Harvard Business School, concluded that there were few industries where "all five forces act so strongly to depress profitability as they do in the airline industry" (IATA, 2011, p. 2). One of the key forces identified was competition between rival airlines. According to Porter, competition among airlines is severe due to the unique characteristics of the airline industry, which include high sunk costs of aircraft, low marginal cost per passenger, and the low barriers to entering and exiting the market, which causes major competition among airlines. Regarding these market conditions, frequent flyer programs play a significant role in capturing and maintaining the profitable passenger demand that can generate continuous cash flows for airlines. Arguably, the frequent flyer programs can also play an important role in handling the remaining forces, such as the threat of new entrants and the threat of substitute products.

Frequent flyer programs can also be used as a defense against rival companies. For example, it is true that even if passengers can find a lower fare on a competitor, they are often unwilling to lose the tier perks of their loyalty program. Additionally, in the current industrial environment, in which most full-service carriers have implemented cost-cutting features, such as charging a fee for seat selection, meals, baggage, and other services, frequent flyer programs play a significant role in keeping loyal passengers by providing these services for free.

The financial performance of airlines is an important factor that affects frequent flyer programs. A study by Dichter (2017) found that the financial performance of U.S.-based airlines has significantly improved, and frequent flyer programs continue to be key in supporting the airlines financially, both directly and indirectly. With the emergence of dynamic pricing models and customized travel options, airlines today track passenger interests to offer tickets within their budget. This allows airlines to reduce the spoil costs of unused seats and helps to improve the financial position of the airline.

Another important factor in airline loyalty schemes is the convergence of analytics in aviation research. Although analytics has traditionally focused on loyalty program activities, it is now used in extensive areas of research regarding loyalty programs. O’Toole and Leininger (2016) specified that United Airlines tracks how many flights in a row a MileagePlus member has been denied an upgrade request and overrides the normal upgrade logic to insure that the member gets upgraded the next time he or she flies. This policy has induced measurable business results. Therefore, it is possible that some airlines have figured how many times a customer is unable to redeem for a free flight and customizes the offering dynamically for this too. However, none of the airlines provided any data regarding these program acceptances or denials.

2.2 Different Types of Frequent Flyer Programs

In the section titled "Concept of Airline Loyalty Programs," historical developments in the evolution of frequent flyer programs and current trends in the aviation market within the scope of loyalty programs are discussed. Meanwhile, here, the different characteristics of various loyalty programs implemented by airlines are examined. First, loyalty programs are classified according to their key characteristics into one of three general types. Second, different types of program structures that are available globally are discussed. Finally, low-cost carrier frequent flyer programs are compared with their full-service rivals.

2.2.1 Frequent Flyer Program Typology

Even if airline loyalty programs show some similarities, every program has unique characteristics that stem from its historical background or the decisions made as the program evolved. Therefore, it can be expected that each individual program will be designed to meet the characteristics of the airline's marketing needs. De Boer and Gudmundsson (2012) classified frequent flyer programs into three different categories—legacy, advanced, and autonomous—and the program types all have 10 different key dimensions used to help describe the characteristics of each type.

The first key dimension of frequent flyer programs, as described by de Boer and Gudmundsson (2012), is the program's strategic focus. Does the program target passengers who spend excessive amounts on travel, or is it also trying to attract less frequent flyers, including people who travel only with promotional ticket prices once or twice per year? The second dimension is the organizational structure of the program. How is the frequent flyer program structured within the airline? Is it placed in the marketing or sales department, overseen by a senior executive who holds multiple responsibilities, or is it run as a stand-alone unit within the company? The third dimension is ownership. Ownership of the frequent flyer program can range from being fully owned by the airline to having outside investors own the system, partially or fully.

The fourth key factor is suitability for third-party investment. This metric is closely linked to the second one, as outside investments would realistically only occur regarding a stand-alone unit (assuming the investor wanted to invest in only the frequent flyer program and not the entire airline). The fifth indicator is the type and level of reporting. How is the frequent flyer program mentioned in the annual report of the airline? Does the company disclose any segment-specific information? The spectrum here ranges from no mention of anything related to the program to the frequent flyer program having its own financial reports. The sixth metric is quantitative. It looks at the percentage of miles that were earned outside the airline for activity with partners in the program. This metric is typically only available for programs with segmental reporting.

The seventh metric is the partner range, and it covers the types of companies that the frequent flyer program partners with, typically starting with travel-oriented partners evolving into those that have everyday spend type partners (for example, a supermarket). The eighth is the scope and width of the awards offered in the program. Is it limited to flight awards, or does it offer a larger award portfolio that includes non-flight awards? The ninth is a staff profile that examines the backgrounds of the people working for the frequent flyer program. Do they mainly come from airline backgrounds, or does the program hire externally as well? The last metric is the type of award allocation policy. The award allocation policy describes how seats are allocated for use with awards and includes different methods, ranging from allocating a fixed number of seats on every aircraft to a fully dynamic allocation mechanism based on revenue management principles, which Vasigh et al. (2016) called the expected marginal seat revenue (EMSR) principle. Table 2.1 presents the key characteristics of the different frequent flyer program types.

Table 2.1

Overview of Different Frequent Flyer Programs

	Legacy	Advanced	Autonomous
Strategic focus	Frequent flyers	Frequent flyers and high credit card spenders	Frequent flyers and everyday spenders
Structure	FFP department (part of Marketing / Sales)	Separate strategic business unit	Separate company
Ownership	100% owned by the airline	100% owned by the airline	Owned by airline and/or outside investors
Suitable for third-party investment	No	No	Yes
Reporting	At aggregate level	May do segmental reporting	Income and balance sheet
Non-air partner accrual as percentage	Small (<20%)	Medium (>20%)	Large (>50%)
Partner range	Travel related (hotel, car)	Travel related and financial services	Travel, financial and everyday spend
Awards	Award tickets and upgrades	Air travel and limited merchandise	Air travel, other travel, merchandise, experiential awards
Staff profile	Airline background	Airline and marketing background	Other backgrounds including retail and finance
Award allocation policy	Fixed – supplemented with distressed inventory	Combination of fixed and dynamic allocation	Combination of fixed and dynamic –any seat is available

Note. FFP = frequent flyer program. Adapted from: de Boer, E. R., & Gudmundsson, S. V. (2012). 30 years of frequent flyer programs. *Journal of Air Transport Management,* 24, 18–24. https://doi.org/10.1016/j.jairtraman.2012.05.003

2.2.2 Legacy frequent flyer programs

The legacy programs can be understood as the original type of program that American Airlines and other early adopters had in mind when they launched their loyalty programs. This type of frequent flyer program focuses on high-frequency travelers who spend heavily on paid flight segments. These types of programs give awards for reaching a certain number of trips, experience points or money spent for free award tickets or cabin upgrades.

In this type, a frequent flyer program is managed by a team in the marketing department of the airline. The department is mainly run by directors from multiple departments, and, for example, the information technology, marketing, and sales departments must agree to promote the program. This type of program is owned entirely by the airline, which enables the airline to be in full control.

The reporting of legacy frequent flyer programs is limited to whatever the airline decides to publish, and revenues from the programs cannot be traced outside of the airline management. In legacy type airline programs, most of the miles are earned from paid segment flights, although some early legacy programs created partnerships with other travel-related companies like hotels and car rental providers. The legacy type of frequent flyer program uses the incremental cost method for accounting for airline miles, whereby the value of the liability reflects the marginal cost of an award seat, which tends to be low. The seat allocation of each flight segment must be done within common parameters, where the revenue management and marketing departments agree. According to Unsal (2018), airlines that promote legacy frequent flyer programs are less likely to accept central standardization of frequent flyer programs because they do not want their highest paying customers to be able to easily change to another airline.

2.2.3 The Advanced Frequent Flyer Programs

Advanced frequent flyer programs are designed to attract and retain new customers for the airline, but as the frequency of travel for the additional segments is lower than legacy counterparts, possibly as low as a few trips per year, the advanced program must offer other ways for its members to earn miles. The airlines that offer this advanced type of loyalty program generally issue credit cards co-branded with banks, such as the Delta SkyMiles Credit Card, or they convert the bank's loyalty currency into airline miles, such as with American Express Membership Rewards. With this application, the airline can expand mileage accrual types significantly, which attracts less frequent travelers.

The evolution from legacy to advanced frequent flyer programs needs a management desire to increase the total number of airline passengers. With the ability to earn miles at more partners outside the airline, the total volume of miles being earned in the program drastically increases. Landry (2008) determined that among airlines of the advanced type, as the programs could no longer satisfy the redemption demand from customers with the original supply of distressed or fixed inventory, management increasingly turned to other solutions to overcome the problem. These solutions could be as simple as buying additional seats from revenue management. Using this application, airlines started requiring more miles for expensive flights where the demand was very high and required fewer miles for low-demand flights.

Advanced loyalty programs have much more power to generate airline alliances and create a broad scope of partnerships, which provides a certain amount of easy cash flow. Due to the flexible scheme of partnerships, airlines using the advanced type of frequent flyer programs tend to use deferred revenue accounting instead of an incremental cost methodology. For this study, five different airlines (United, American, Delta, Hawaiian, and Alaska) with an advanced loyalty program scheme were evaluated regarding their credit card specifications.

2.2.4 Autonomous Frequent Flyer Programs

An autonomous frequent flyer program is structured as a stand-alone unit apart from the airline company. All connections with the airline are managed through bilateral agreements with full transparency. This type of frequent flyer program runs as a separate business with its own profit and loss responsibility. The autonomous frequent flyer programs are the only type of program that can attract outside investors to acquire an equity stake in the company.

In these programs, many of the miles are earned from airline partners, which include categories outside of travel, such as retail, insurance, and online marketplaces. However, on the redemption side, many of the miles are redeemed for free seats or upgrades. This imbalance creates an ongoing positive cash flow for the airline.

In this type of loyalty scheme, the program becomes a distribution channel for the airline. With its stand-alone status, the program is managed like any other private company. Depending on the ownership structure (airline, outside investors, or even public float), the frequent flyer program will have extensive external reporting. Multiplus and Smiles in Brazil, for example, are both listed on the stock exchange, thereby providing extensive reporting to the market.

In assessing the programs, it is clear that there are some that have characteristics of more than one program type. For example, it is common to see a legacy program that has a vastly expanded partner range, which happens, as Porter stated for the IATA (2011), because the airline industry has several rivals.

2.2.5 Frequent Flyer Programs as a Global Perspective

Although frequent flyer programs around the world eventually exhibit similar features, there are a few features that you can typically only find in specific regions. For example, the frequent flyer programs in North America have some distinct specifications unique to that continent. For example, these programs offer complimentary upgrade privileges as part of their elite, diamond, or other top-tier programs, where seats in the comfort, business, and first-class cabins that are not sold are available to those members as a standby upgrade. For example, American Airlines AAdvantage Executive Platinum members receive unlimited complimentary upgrades to domestic businesses or first-class cabins on flights of 500 miles or less (American Airlines, 2020). Its competitor, Delta Air Lines, started using a time-based system to determine when a member can be upgraded. In particular, for available first-class upgrades, Diamond and Platinum Sky Miles Medallion members are cleared to upgrade five calendar days prior to departure, Gold Medallion members are cleared three calendar days prior to departure, and Silver Medallion members are cleared one calendar day prior to departure (Delta Air Lines, 2020). Only a few other frequent flyer programs offer such extensive awards globally as they are more restrictive for their luxury cabins and services. However, one exception is the LATAM PASS program run by LATAM Airlines in South America. This loyalty program offers unlimited Courtesy Cabin Upgrades to its Black and Signature Black members, which can be requested when the flight is open for check-in (LATAM Airlines, 2020).

Weed (2016) revealed that some airlines started using a new distribution strategy that offered cabin upgrades for a reduced fare or a reduced number of air miles. This strategy reduces the number of free cabin upgrades available during the check-in process, which can sometimes cause inconvenience for top-tier status passengers. Weed stated that in 2011, Delta Air Lines actually sold only 14% of its domestic first-class cabin, leaving 86% of capacity for upgrades, but by 2015, more than half of the first-class seats were sold as cash fares, and therefore, Delta had a drastically reduced number of seats available for upgrades.

Another feature of North American frequent flyer programs is that elite program qualification periods are based on calendar years. Outside North America, most frequent flyer programs implement rolling windows or some other period that is not synched to a calendar year. This means that each member has an individual qualification, and elite tier membership periods are distributed throughout the year. For example, Turkish Airlines uses an individual calendar period, which enables passengers to start their tier status any month when they have reached the travel requirements.

The frequent flyer programs based on the European continent started later than their U.S.-based competitors, but they have had successful results. According to Schaeffer (2009), the Miles & More frequent flyer program implemented by Lufthansa Airlines grew its sales from EUR 3 million to EUR 154 million, coming from 0 to 700,000 co-branded credit cards, respectively, between 1998 and 2008. However, the European frequent flyer programs have very resident-specific applications. For example, the Flying Blue program requires a different number of experience points to obtain top-tier status for customers residing in France (Air France–KLM Group, 2020b). Gudmundsson, de Boer, and Lechner (2002) found that the strategy used by some airlines assumes that their loyalty programs play a different role in markets other than their home country, so that the airlines offer fewer privileges to their in-country customers but offer extensive awards to other destinations. For example, the Turkish Airlines Miles & Smiles loyalty program offers the Diners Club credit card for passengers residing in Slovakia, which comes with free airport lounge access globally, but this privilege does not exist in their home country (Turkish Airlines, 2020).

Middle Eastern carriers (including the three major Gulf carriers Emirates, Etihad Airways, and Qatar Airways) allow families to collect miles as a group. The program allows family members to pool all of their miles earned in a sin gle account. Another common feature of Middle Eastern carriers is that they have local offices to serve loyal clients in the major cities they serve.

Finally, there are the Asia Pacific region carriers. The Cathay Pacific program offers special cultural meeting events for their top-tier members who reside in Hong Kong. Similar to the United States, Cathay Pacific also offers free upgrades to premium cabins during the embarkation process (Cathay Pacific, 2020). Singapore Airlines tends to restrict its premium cabin upgrades only to their own loyalty programs so that other members of the Star Alliance global alliance cannot book an award seat with miles on Singapore Airlines in business class or suites (Singapore Airlines, 2020).

Finally, the Velocity frequent flyer program offered by Virgin Australia Airlines allows only residents of specific countries to enroll, so the program is very restrictive regarding its members (Virgin Australia Airways, 2020).

2.2.6 Differences Between Low-Cost and Full-Service Carrier Frequent Flyer Programs.

The aviation industry recognizes two main types of airline business models, classified as full-service and low-cost carriers. Although there is increasing convergence between the two models, low-cost carriers have a strong market presence around the globe, with gradually lower ticket prices. Furthermore, some air routes are serviced only by ultra-low-cost airlines, such as Allegiant Airlines.

The main purpose of these low-cost carriers is to provide seats with a lower marginal cost than full-service carriers. Consequently, the design of their frequent flyer program greatly differs. In the United States, the most successful loyalty program on a low-cost airline is run by Southwest Airlines (Southwest Airlines, 2020).

According to Klophaus (2005), frequent flyer programs originally belonged solely to the domain of legacy airlines; thus, low-cost airlines were reluctant to adopt these programs. However, it is evident that low-cost airlines ultimately successfully adopted the concept of loyalty programs because of their financial contribution to revenues and yields. Further, these programs are organized differently compared to full-cost carrier programs. First, the structure of low-cost carrier programs is relatively simple, which reduces passenger confusion. Second, these programs do not provide elite services, such as airport lounge access.

However, due to the current trend toward hybrid strategies in the airline industry, some full-service carriers have implemented the use of their subsidiary airlines, which offer a low-cost service for passengers. Jetstar (for Qantas), Scoot (for Singapore Airlines), and Transavia (for Air France–KLM) are just a few examples of low-cost carriers operating today as part of a larger full-service carrier. With these types of carriers, passengers can earn and redeem their miles with either the full-service airline or the airline's subsidiary, which is at a reduced price. For example, Air France–KLM Flying Blue members, who fly on a basic reduced fare on Transavia flights, can earn 250 award miles by paying an extra EUR 5 per person, per one-way flight (Air France–KLM Group, 2020b).

In another study, Reales and O'Connell (2017) investigated the mileage-earning structures of global airlines, and their findings are summarized in Figure 2.1. According to the graphic, in 2015, U.S.-based full-service carriers who had the greatest number of loyalty program customers also had the greatest number of active members.

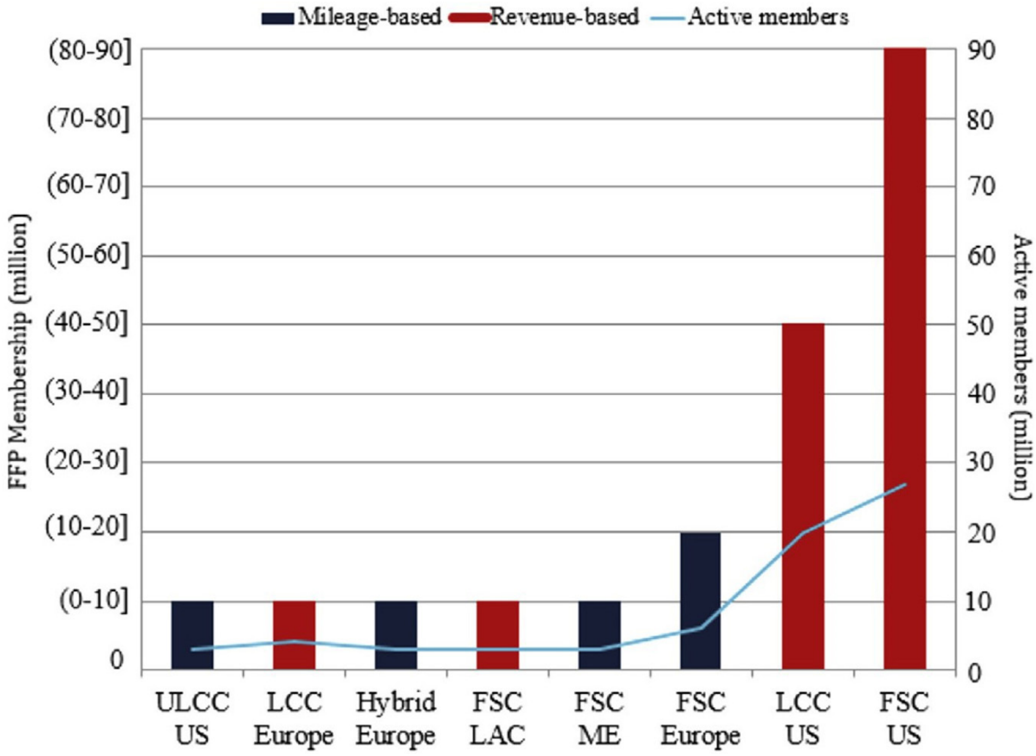


Figure 2.1. Airline frequent flyer program membership, accrual method, and active members in 2015.

Adapted from: Reales, C. N., & O'Connell, J. F. (2017). An examination of the revenue generating capability of co-branded cards associated with frequent flyer programmes. *Journal of Air Transport Management,* 65, 63–75. doi:10.1016/j.jairtraman.2017.08.001

Note. FFP = Frequent flyer program; FSC = full-service carrier; LCC = low-cost carrier; ULCC = ultra-low-cost carrier.

2.3 The Structure of an Airline Loyalty Program

A frequent flyer program is, in many ways, unlike any other business. At its core sits a cryptocurrency whose value greatly varies depending on its ultimate use in award form. To understand the specifications of a frequent flyer program, it is useful to break it down into key specifications. This section focuses on five key areas: the accrual of miles, award redemptions, elite programs, member communications and promotions, and program policies.

2.3.1 The Accrual of Miles

Logically speaking, although it is all about the award at the end of the journey, the way to get there is through the accrual of miles. This section of the literature review focuses on how members can earn miles through various options and why different loyalty programs have adopted various structures.

2.3.1.1 Earning Miles From Flights

Earning miles from flights is the first and core element of a frequent flyer program, beginning with the first program, American Airlines AAdvantage. The logic behind this system is simple—for every flight the customer takes, they will receive a number of miles depending on various criteria, including distance, the fare paid, and tier status in the program. In general, there are three types of accrual mechanisms in the industry: those based on distance traveled (sometimes combined with the fare paid), a fare-based accrual system (typically referred to as value-based accrual), and systems that are based on other criteria, such as a count of flight legs.

Although some full-service carriers adopted the value-based approach to mileage accrual, most airlines still use the distance-based structure, especially in European and Asian carriers. In basic form, passengers earn one frequent flyer mile for every mile traveled. However, most distance-based programs use various factors that impact how many miles are ultimately earned. These modifications or accelerators were designed to provide greater rewards for more profitable behavior. The most apparent of such modification is observed when the airline provides extra award miles for travel in luxury cabins, where passengers can earn up to three or four times more miles than the standard economy class allows. Figure 2.2 shows the mileage-earning structure for Delta Air Lines, exemplifying such a structure.

Fare Classes on Delta, Delta Shuttle, or Delta Connection-Marketed Flights	MQMs(1) (percentage of distance flown(2))
First: F	200%
Business: J	200%
Discounted First/Delta Premium Select: P, A, G	150%
Business and Discounted Business: C, D, I, Z	150%
Economy: Y,B	150%
Delta Comfort+®: W	100%
Economy, Discounted and Deeply Discounted Economy: M, S, H, Q, K, L, U, T, X, V, E	100%
Award Travel: R, S, O, N	No MQMs earned

Figure 2.2 Delta Air Lines SkyMiles earnings table.
Adapted from Delta Air Lines. (2020). *Delta SkyMiles redemption: How to use miles.* Retrieved January 9, 2020, from https://www.delta.com/us/en/skymiles/how-to-use-miles/overview
Note. MQM = Delta Medallion Qualification Miles.

Some airline loyalty programs exclude the lowest fares from earning any miles at all. These programs combined distance and value in the form of a zonal system. The number of miles awarded is a function of the zones of origin and destination combined with the particular fare class traveled, such as with the Air France–KLM Experience Points system.

The U.S.-based frequent flyer programs have implemented value-based accrual structures, starting with Delta Air Lines at the start of 2015, quickly followed by United Airlines in March of the same year, and ultimately, American Airlines in 2016 (the latter was going through integration with U.S. Airways during the earlier period). Notably, Alaska Airlines, after becoming the fifth-largest carrier in the United States following its integration with Virgin America, decided to maintain a miles based accrual model. The reason for implementing a value-based system lies in the fact that it makes no business or economic sense to give the same reward to two passengers who pay distinctive fares for travel on the airline.

Chun and Ovchinnikov (2015) noted that switching from the distance to the value-based model triggered higher fares for the same product or service for passengers to qualify for tier status. One benefit of this model is that passengers can earn numerous reward miles with just a few flight segments when paying premium fares, whereas with standard segments, they would need to travel more and on different flight segments. Further, these loyalty program models have advantages and drawbacks. They are conceptually easy to understand and communicate but depend heavily on the customization required to make them workable. When a loyalty program implements a value-based accrual methodology, this does not necessarily mean that redemptions are value-based as well. Currently, some of the frequent flyer programs have implemented a hybrid strategy to address their special customization requirements. From a global perspective, six different types of airline loyalty program structures can be observed in hybrid models. Table 2.2 overviews the different loyalty models, exemplifying each category.

Table 2.2

Overview of Mileage Accrual and Redemption Types

REDEMPTION BASIS / EARN BASIS	Fare	Zones	Distance
Fare	• Accrual is based on actual dollar spend • Loyalty currency has fixed nominal value and can be used for any fare *Example:* **Norwegian Rewards**	• Accrual is based on zones and booking class • Loyalty currency has fixed nominal value and can be used for any fare *Example:* **Air New Zealand Airpoints**	• Accrual is based on TPM and booking class • Commercial fare is translated into miles-amount (in addition to classic grid) *Example:* **Aeroplan Market Fare Flight Rewards**
Zones	• Accrual is based on actual dollar spend • Redemption grid is based on zones *Example:* **American Airlines AAdvantage**	• Accrual is based on zones and booking class • Redemptions are based on zone of origin and zone of destination *Example:* **Scandinavian Airlines EuroBonus**	• Accrual is based on TPM and booking class • Redemptions are based on zone of origin and zone of destination *Example:* **Singapore Airlines KrisFlyer**

Adapted by author using material from Airline Internet Sites Norwegian, Air New Zealand, Air Canada, American Airlines, SAS and Singapore Airlines (2020).
Note. TPM = Traveled Passenger Mileage

2.3.1.2 Earning Miles from Non-Airline Activities

From the beginning, airlines have realized that their loyalty programs offered an opportunity to sell some of their currency to partners, given that passengers wanted to grow their mileage accounts, and partners were keen to drive business by luring in new customers. Today, the number of miles earned from non-air activities exceeds those earned by flying on the airline. Some examples can be found in Figure 2.3.
In the currently evolving programs, the income received from the sale of miles to external partners has become a driving force behind the program's financial success, which enables continuous cash flow to the airline of income from banks and retailers, providing financial stability for the airline.

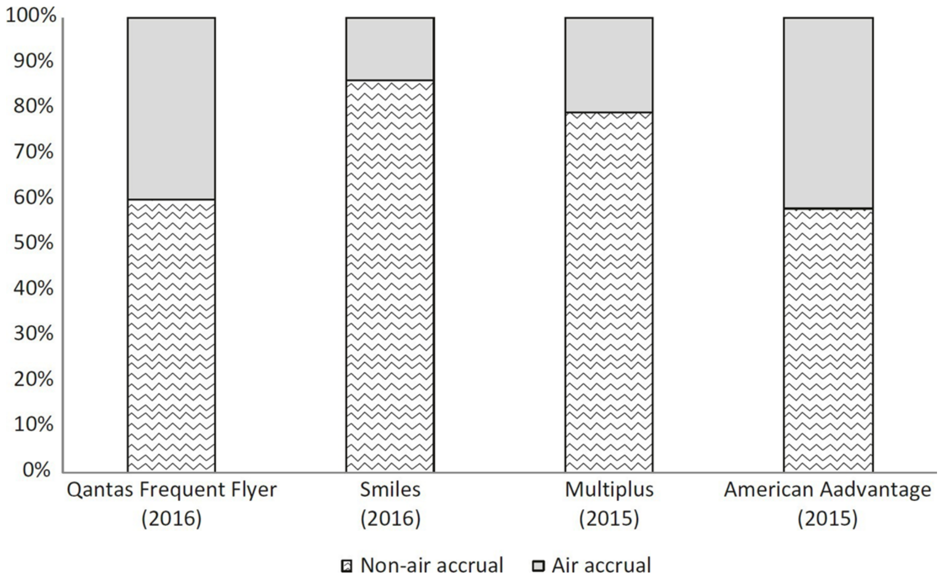


Figure 2.3. Select airline mile accrual schemes.
Adapted from: De Boer, E. R. (2018). Core Elements of the Frequent Flyer Program. In *Strategy in Airline Loyalty* (pp. 59-114). Palgrave Macmillan, Cham.

In this mileage earning methodology, partners enable passengers to earn miles through purchases with partner companies, such as car rental, hotel, and cruise companies. However, given the typical spending associated with these categories and the way miles are allocated, the mileage earning potential is somewhat limited for the average frequent flyer. However, including co-branded credit card partnerships allows passengers to earn miles from a far larger proportion of their everyday spend. The typical co-brand credit card value proposition allows members to earn a fixed number of miles per monetary unit. For example, 1 air mile for each $1 spent. Furthermore, the airline co-branded credit cards offer large sign-on bonuses and give credit miles, which has enabled the credit card category to become a significant driving force for airline mileage accrual schemes.

2.3.1.3 Exchanging Frequent Flyer Miles for Other Services

Today, converting air miles or bonus points between airlines and other partners is extremely useful in considering additional customer demand. By offering conversions from other loyalty programs, frequent flyer programs have started to dip into a far larger pool of loyalty currency balances. Conversion partners range from bank loyalty programs to retail and fuel. Although these programs typically would offer their proprietary awards portfolio, some segments of the market were interested in converting those loyalty points into frequent flyer miles. For instance, Accor Hotels Group (2020) awards additional air miles to Air France–KLM airlines when their frequent flyers stay at Accor Hotels Group properties. By converting these other currencies, passengers can elastically personalize their travel needs. However, due to the exchange between different loyalty currencies, passengers can lose some of the value in their points. For example, an award air ticket worth 100 Euro in Air France can be exchanged by 40 Euro hotel reduction credit on Accor Hotels Group.

2.3.1.4 Purchasing Air Miles

Today, many loyalty programs have started to offer members the option of buying miles directly from the airline to reach the required number for a particular award, such as an upgrade or to protect their tier status. With this scheme, when passengers are short of miles, they can top up the missing miles by purchasing the needed miles for a fee. Some programs impose restrictions on the total number of miles a member can buy within a certain period, such as the year rule imposed by Turkish Airlines. By making the miles more accessible at a price, some wondered whether it would undermine the overall attractiveness of a frequent flyer program, especially for top-tier members who think that status cannot be purchased but, rather, must be awarded. However, it seems that the most frequent flyer program managers have made the trade-off and realized that the revenues from the sale of miles would outweigh the short-term negative impacts of disgruntled loyal passengers. One notable exception is Lufthansa, which discontinued the option of purchasing miles in 2014. However, Lufthansa continues to offer a mile's advance option whereby Senator tier members can receive an advance of up to 50,000 miles and HON Circle members (the highest tier) can receive an advance of up to 100,000 miles.

2.3.2 Redemption of Miles

Since the first award ticket offered by American Airlines for a round-trip ticket to Hawaii, the award side of these programs has included more and more options daily. Today, passengers can spend their miles not only on free flights or cabin upgrades but also as compensation for their market purchases, gasoline expenses, hotel stays, medical expenses, and in many more sectors. In essence, airline miles have become cryptocurrency exchangeable for various goods and services. Emirates Airlines (2016) stated that since the beginning of its loyalty program in 2000, members have spent more than 220 billion air miles from their accounts. According to de Boer (2017), air travel is the most in-demand travel reward because its perceived value is greater than merchandise, which has a lower mile-unit cost.

According to Drèze and Nunes (2007), the cost to the airline companies of these awards and the attractiveness of the rewards to customers are the key elements in designing a frequent flyer program. In their research, the authors stated that increased divisibility can allow for increased loyalty among those with low mileage balances. However, concurrently, divisibility can be demotivating as it diminishes the effectiveness of awards as goals (because the awards are too easy to achieve, the stimulating effect diminishes). However, another study conducted by Dorotic, Verhoef, Fok, and Bijmolt (2014) demonstrated that the decision to proceed with redeeming an award significantly enhances purchase behavior before and after a redemption event, even when members redeem just a fraction of their accumulated points.

Another study conducted by Meyer–Waarden (2013) showed that awards can be categorized as economic, social–relational, hedonic, informational, or functional. The author distinguished between two types of motivation regarding award redemption in frequent flyer programs: intrinsic and extrinsic. Intrinsic motivation can be described as being motivated by getting an award according to the interests and priorities of a member, while extrinsic motivation results from the offer of external awards in exchange for the desired behavior. Therefore, Meyer–Waarden suggested that programs could be improved by better understanding (or segmenting) different customer purchase orientations for different market segments. Because of these factors, airlines have begun to use different award segments for different customer needs.

Airlines typically either use dedicated inventory classes (also known as reservation booking designators) for award travel, or they map a certain category of award travel to a corresponding travel class. For example, in Star Alliance's global frequent flyer alliance (2020), passengers can redeem their first-class tickets with (O) class, business class tickets with (I) class, and economy-class awards with (X) class.

2.3.2.1 Limited Capacity of Airline Awards

A study by de Boer (2017) stated that most airlines kept 5% to 8% of their seat inventory for award travel redemptions. However, in today's marketing environment, the chance of finding available seats depends on different factors, such as the desired class of travel, the number of people in the booking group, the tier status of the booking partner, and the availability from partner airlines.

The first factor researched by de Boer (2017) included the finding that redemptions for business and first-class tickets tend to become complex processes, as airlines become more protective of their high-yield products. Moreover, some of the airlines have completely cordoned off this inventory of seats. For example, Air France–KLM (2020b) only allows its own top-tier members to redeem miles for the exclusive Air France La Première (first-class) product.

The next factor is seasonality. Members will face difficulty trying to secure a seat on a popular route during a busy season. According to an audit report by the U.S. Department of Transportation, among the airlines included in their investigation, award seats were available for numerous flights during most of the year. Emphatically, 99% of the flights had award seats available for the routes queried, out of which 63% offered seats at the classic or saver level. However, this number dropped to around 13% for flights during a high-traffic holiday week (U.S. Office of the Secretary of Transportation, 2016). Furthermore, a 2019 study of airline award travel by IdeaWorks found that not only had free seat availability improved in 2019 compared with 2018 on most carriers, but it had also improved each of the past five years (McGinnis, 2019). Since dynamic award pricing started, the average mileage/point cost of an economy-class reward ticket on major U.S. airlines has declined significantly. Table 2.3 shows the results of this research.

Table 2.3

Comparison of Reward Prices Among U.S. Carriers

Average Reward Prices for 2019 – Top North American Airlines
Top 251 - 2,500-mile reward markets, economy class rewards

Airline	Program Name	Average Reward Price		Change from 2018 to 2014
		2019	2014	
Southwest	Rapid Rewards	7,367 points	7,887 points	-6.6%
JetBlue	TrueBlue	16,708 points	17,626 points	-5.2%
Alaska Group	Mileage Plan	17,000 miles	23,429 miles	-27.4%
Delta	SkyMiles	19,680 miles	26,179 miles	-24.8%
American	AAdvantage	23,700 miles	29,107 miles	-18.6%
United	MileagePlus	25,000 miles	27,786 miles	-10.0%

Based upon 50 mileage- and point-level queries for each airline at the lowest available reward price.

Adapted from: McGinnis, C. (2019, July 1). *Airline award seats cheaper, easier to find. Wait. What?* Retrieved January 11, 2020, from https://www.ideaworkscompany.com/wp-content/uploads/2019/09/2019-07-01-Houston-Chronicle.pdf

Furthermore, the McGinnis (2019) also quoted blogger Matthew Klint, stating, "The numbers do point [sic] a rosier picture of domestic redemptions, but these come at a cost. While legacy airlines have 'thrown us a bone' by lowering the price of some domestic award tickets, we have seen a consistent increase in the cost of premium cabin tickets. For those who like to use their miles for business or first class, we can expect redemption prices to continue to rise."

As bottlenecks began, especially for luxury class travel tickets, airlines also became increasingly innovative in reallocating the existing pie to insure more equitable use of the available pool. Many programs started offering either preferential or additional award seat access to elite tier members. Some programs do not publish this benefit, whereas others do. For example, Lufthansa (2020) allows its senator members to enjoy improved flight award booking availability, and for its highest HON Circle tier, it offers guaranteed award availability for members plus three companions up to 14 days before departure in economy and business class once there are commercial seats available. Turkish Airlines also follows the same principle with its policy that once seats are available in the aircraft, frequent flyer program passengers can book a reward ticket.

For those enrolled in the United Airlines loyalty program, Premier members have better access to Saver Awards in economy class. Additionally, Premier Platinum and Premier 1K members have better access to Saver Awards in business class or first class in two-cabin aircraft. Many programs also differentiate award availability by booking source, which means that different availability is provided for members of partner programs, such as elite members of the SkyTeam global alliance being treated as elite customers for the programs of each of the airlines in the alliance.

Another perspective stated by de Boer (2017) and Unsal (2018) is that, even if there is a formal published policy, many airlines will still restrict access to business and first-class award travel for members of other airlines within the same alliance. For example, Singapore Airlines restricts the availability of business and first-class award travel on its Airbus A380s and Boeing 777–300ERs to its own KrisFlyer program members, who are permitted to book award seats in business and first class on these aircraft types. The reasoning is that these aircraft have the most advanced products, including the suite first-class product on the Airbus A380, so the airline reserves the use of these services for their own customers. Partner airline members can still book award travel if seats are available on the airline’s Airbus A330, Boeing 777–200, Boeing 777-200ER (and the non-ER), Boeing 777–300, and Airbus A350 flights. Kralev (2008) and Unsal (2018) also noted that some frequent flyer programs block access to partner awards for a certain period, such as United Airlines and Lufthansa, when closing access to certain Star Alliance partner award inventory.

To overcome the limited seat availability on an airline, some airlines started implementing a wait-list option for award tickets that are unavailable on demand. Cathay Pacific Asia Miles, ANA Mileage Club, Turkish Airlines Miles & Smiles, and United MileagePlus all permit wait-list bookings for redemption tickets (which differ from widespread upgrade wait-lists). Similar to revenue tickets, a wait list booking can be made for a flight or itinerary that does not have award seats available. Instead of booking the award ticket, the member is offered the possibility of wait-listing. If the award seat becomes available, the member is notified and can proceed to claim the ticket before a specified deadline.

2.3.2.2 Fixed Award Charts

Today, many programs continue to produce award charts that inform members of how many miles are required for a particular itinerary. Most of them use a zonal approach, effectively allowing the program to group destinations and origins in certain geographic zones while reducing the complexity of the award chart. Most programs price their awards based on return trips. Programs are increasingly allowing one-way travel, meaning that members can book an itinerary without a point of return at a rate that is half the return award mileage (Turkish Airlines, 2020). Table 2.4 provides the Star Alliance’s global fixed award chart for 2020.

Table 2.4

Star Alliance Award Chart 2020

Star Alliance Award chart

TAXES AND FEES: In addition to the point amounts listed below, taxes and fees apply to the award tickets and are the responsibility of the passenger. Government taxes/fees and carrier fees/surcharges from $2,5 will vary based on itinerary and will be calculated at the time of award booking.

	Domestic Europe*	Europe	North & Central America	South America & Caribbean	North/central Africa & Middle East	Southern Africa	South East Asia	Central Asia & Far East Asia	Pacific	India	Hawaii
Domestic Europe*	20 000	–	–	–	–	–	–	–	–	–	–
	30 000	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–
Europe	–	40 000**	70 000	90 000	60 000	90 000	90 000	90 000	120 000	80 000	110 000
	–	60 000**	110 000	140 000	90 000	140 000	140 000	140 000	180 000	120 000	160 000
	–	80 000**	150 000	190 000	120 000	190 000	190 000	190 000	240 000	160 000	210 000
North & Central America	–	70 000	25 000	50 000	80 000	100 000	90 000	90 000	90 000	90 000	50 000
	–	110 000	50 000	75 000	120 000	150 000	140 000	140 000	140 000	140 000	75 000
	–	150 000	70 000	100 000	160 000	200 000	190 000	190 000	190 000	190 000	100 000
South America & Caribbean	–	90 000	50 000	25 000	100 000	70 000	110 000	110 000	110 000	110 000	90 000
	–	140 000	75 000	50 000	150 000	110 000	160 000	160 000	160 000	160 000	140 000
	–	190 000	100 000	70 000	200 000	150 000	210 000	210 000	210 000	210 000	190 000
North/central Africa & Middle East	–	60 000	80 000	100 000	25 000	60 000	70 000	80 000	100 000	70 000	110 000
	–	90 000	120 000	150 000	50 000	90 000	110 000	120 000	150 000	110 000	160 000
	–	120 000	160 000	200 000	70 000	120 000	150 000	160 000	200 000	150 000	210 000
Southern Africa	–	90 000	100 000	70 000	60 000	25 000	90 000	120 000	100 000	90 000	120 000
	–	140 000	150 000	110 000	90 000	50 000	140 000	180 000	150 000	140 000	180 000
	–	190 000	200 000	150 000	120 000	70 000	190 000	240 000	200 000	190 000	240 000

Adapted from:Star Alliance. (2020). *Redeem miles or points*, Star Alliance. Retrieved January 11, 2020, from https://www.staralliance.com/en/redeem

Some frequent flyer programs also allow the mixing of different carriers on a single award ticket. Others allow the mixing of cabin classes on a single award ticket. Many programs today offer round-the-world tickets, such as Star Alliance (2020) and SkyTeam (2020). For example, Korean Air's SKYPASS program offers a round-the-world ticket in business class on Korean Air and SkyTeam partners for 220,000 miles (Korean Airlines, 2020).

2.3.2.3 Dynamic Award Charts

Today, many airline loyalty program managers believe that pricing award inventory at a fixed number of miles is no longer sufficient to match the demand for seats. According to de Boer (2017), the increase in the demand for seats is a function of two factors. The first factor is that the membership bases have grown significantly over time, and the second factor is that the range of partners where members can earn miles has widened substantially. This causes passengers who have too many miles to be chasing too few awards seats on flights. To address this, some programs use fully dynamic pricing, while others deploy fixed step-ups, sometimes combined with a price ceiling. For example, Delta Air Lines has not published a fixed chart since 2015. Members can only determine the required miles for a travel award when they request an online quote.

2.3.2.4 Extra Costs of Award Tickets

Award travel tickets, like regular commercial tickets, are subject to government-imposed taxes and airline fees, such as fuel surcharges. In some instances, these additional charges can be significant and will profoundly affect the member value proposition, especially for international routes, where an airline has extensive costs for security and immigration and customs services. For example, a one-way economy-class award flight on Virgin Atlantic from London to Los Angeles is priced at 15,000 Flying Club miles, plus carrier-imposed surcharges, taxes, fees, and other charges of GBP 209.17. Similarly, an Air France–KLM Flying Blue program member has to pay EUR 173.53 plus 100,000 miles for a one-way flight in business class from Amsterdam to Rio de Janeiro. Conversely, for domestic U.S. tickets, the extra surcharge is very limited. Therefore, passengers may focus on using their miles for premium cabins, where they will save a lot, while the savings are only minimal if they use their miles for promotional economy tickets. Especially for intercontinental routes where airlines provide first-class suites and special suite cabins, the savings ratios are multiple times higher than normal discounted economy tickets.

Another application introduced by some airlines was a new program where passengers could pay their flight taxes with miles, such as Lufthansa and Turkish Airlines (2020). However, on a practical level, it created cash outflow for the airlines because the airline must pay the amount of tax to the government with cash. So those airlines began charging a lot of miles to pay the taxes. At times, the mileage requirement to pay ticket taxes can exceed the original award ticket mileage requirement, which makes it a useless application for passengers. A study by Buckingham (2011) showed that, in some markets, due to airport taxes and carrier-imposed fees, the core flight award proposition became uncompetitive.

2.3.2.5 Redemption with Airline Partners

Currently, most airline loyalty programs offer non-air awards that include virtually unlimited range of goods and services, and in some cases, awards that money cannot buy, like backstage passes or access to exclusive meet and greets, like those offered in the Cathay Pacific loyalty program. Furthermore, some airline loyalty programs offer a form of cryptocurrency whereby the miles are converted into monetary gift card values or virtual credit cards, allowing the member to purchase anything of his or her choice.

Today, some frequent airline flyer programs are running calibrated non-air portfolios, where low-margin items (representing a high award unit cost; for example, consumer electronics) are balanced with high-margin items that represent a low award unit cost, such as luggage tags. According to Brown (2014), United Airlines uses its knowledge of customer behavior to generate rich targeted offers to drive redemption options, which brings redemption management costs to a minimum.

Travel redemption options include various exclusive services, such as hiring private jets, as with Delta Air Lines, which in 2016 commenced a private jet service for redemption. Starting at 2.5 million miles for a $25,000 Jet Card, SkyMiles members can redeem miles for the Delta Private Jet service.

2.3.3 Elite Status Qualification

Perhaps one of the most powerful features of the frequent flyer programs, elite tiers have become an essential component of the most frequent flyer program. Elite tiers can be described as privileged member status that is attained by meeting certain qualification criteria. The most commonly used criterion is the accumulation of a certain number of miles by flying during a certain period. To increase the program availability for short-haul travelers, the programs commonly offer qualifications based on the number of segments flown, such as with the Delta–Air France–KLM partnership. The period within which the activity is required varies as well. Some loyalty programs offer non-air miles that help customers qualify for elite status, making the program more generous and attractive for customers. However, in some instances, a cap applies to elite miles earned outside the airline in a presumed effort to maintain the core pull element of the frequent flyer program. For example, Turkish Airlines passengers can use their co-branded credit card earned miles to qualify for the airline's tier status levels up to elite level. However, the top-tier status, called Elite Plus, cannot be achieved this way.

A study conducted by Kopalle, Neslin, and Sun (2009) outlined the challenges in designing a tiered program. According to the study, if the tier requirements are too lax, there is not much pressure, but once the member reaches a tier, paid flights increase because the member receives continuously better service. If the requirements are too tough, there is more pressure, but it takes members longer to reach a tier, and many members do not make it, so elite-level specifications become irrelevant if most of the passengers will be unable to reach that level.

In another study conducted by Drèze and Nunes (2009), the authors demonstrated that when more and more members get access to the top-tier level, it dilutes the perception of status. The ability to truly recognize high-value members through an elite-tier system will depend heavily on the structure of the qualification scheme. In reality, given the uniformity of most qualification structures, the program will miss out on certain high-value members because their travel patterns are not recognized under the qualification structure. According to Unsal (2018), due to this structuring, an airline could potentially categorize a passenger as a lower tier, even if the passenger accumulates 2 million airline miles. To overcome this problem, Lufthansa Airlines (2020) started using lifetime status, whereby passengers earn lifetime status when they accumulate a certain number of miles.

A study by Wagner, Hennig–Thurau, and Rudolph (2009) showed that demoting members from a higher status (Gold) to a lower status (Silver) in the Star Alliance could profoundly and negatively affect members. The study results demonstrated that loyalty intentions were lower for demoted members than for those who had never been awarded a preferred status in the first place.

In recent years, to capture the loyal passengers of other airlines, Delta Air Lines started offering a status match, whereby the airline recognizes a tier status given by a competitor airline and matches those statuses with their own tier status for a trial period of 3 months. If passengers collect a certain number of miles within that period, they will continue to use the matched status level for another year. If an airline can provide a reporting about status protection, researchers can analyze whether the airline is successful or not in keeping their elite members in their loyalty program.

Another interesting phenomenon involves hidden tiers. Hidden tiers get their name because they are not publicized by the program, and access to this exclusive club may be done on an invitation-only basis, such as with United Airlines Global Services, American Airlines Concierge Key, Delta Air Lines 360, and British Airways Executive Club Premier (British Airways, 2020). Each of the programs has laudable benefits regarding what is awarded to the highest regular tier and, in some cases, more.

2.4 Economics of Frequent Flyer Programs

This section of the literature review evaluates two different economic approaches related to frequent flyer programs. In the first section, traditional economic theory, including the main economic instruments, such as the theory of marginal cost, competition, and economies of scale, is used to evaluate the core principles of frequent flyer programs. In the second section, the principles of behavioral economics are used to discuss passenger attitudes toward airline loyalty programs, especially the principal–agent relationship effect on frequent flyer program is discussed. Finally, accounting principles related to the economics of frequent flyer programs are discussed. According to McCaughey (2008), frequent flyer programs serve several main economic purposes for an airline. Some of these economic benefits include erecting barriers to entry, maintaining customer loyalty through increased switching costs and using the loyalty program as a sophisticated pricing tool. Regarding the sophisticated pricing effect, price discrimination is a critical characteristic related to frequent flyers. Price discrimination is characterized by considerable variation in ticket prices, which allows airlines to offer the same seat for an increased variety of different price subcategories. According to Vasigh et al. (2016), members of an airline frequent flyer program who have relatively low elasticity regarding prices tend to have a greater willingness to pay more to fly on their preferred airline.

Switching costs is another important principle in loyalty program economics. Airlines tend to offer various discounts, extra privileges, and perks to their customers to increase the cost of switching to another airline. This effect is even stronger if the consumer is a member of the airline's program and has a meaningful mile balance with that airline. An elite member of an existing program who has a significant mile balance will think twice about defecting to another program, where he or she would likely have to start from scratch at the basic level in the new program. Recall, however, that to capture the most loyal customers from other airlines, Delta Air Lines (2020) now offers the continuous status match program previously mentioned.

Barriers to entry are another factor related to frequent flyer economics. If an airline intends to start operating on a new route regardless of legal limitations, an important factor will be to conduct research into existing frequent flyer programs. If there is a strong loyalty scheme in that market, either joining the existing program or operating as a low-cost airline will be the preferable options for entering this new market

2.4.1 Behavioral Economics in Frequent Flyer Programs

Similar to how economic theories help explain why airlines implement frequent flyer programs, behavioral economics can be used to evaluate customer behavior. Behavioral economics combines different disciplines, from psychology to cognitive science. Unlike traditional economics, which by and large assumes that consumers are rational, behavioral economics recognizes that consumers do not always behave rationally, resulting in a more complete picture of how individuals behave in the marketplace.

According to Kierts et al. (2006), behavioral economics says that a loyalty member who is only 1,000 miles short of the necessary miles for a long-haul flight in the suite class of his loyal airline is likely to do various things, many of which may not be all that rational, to get those last 1,000 miles to reach the highly coveted award. This passenger might take an extra flight to get the miles or buy the remaining miles at a relatively high cost per mile. In this instance, Kiertz et al. concluded that increased willingness to invest effort is a function of the proportion of original distance remaining to the goal. As airline loyalty programs confer social capital and status to some people, this makes it more likely that they might act irrationally from an economic standpoint to achieve this status and less inclined to objectively evaluate whether they are getting a good deal with their redemptions. This also makes it more important to provide customers with some level of transparency.

The principal–agent relationship is another important facet of airline economics. Within this scope, commercial travelers, in particular, tend to select seats that maximize their comfort or maximize their earned air miles, regardless of the price of the ticket, because they are not paying for the tickets themselves. It was noted by de Boer (2017) that corporate airline programs, in particular, try to capture high-paying loyal customers because they will improve the airline's profitability. However, it reduces the ticket sales of the commercial passenger's company if they could find a significantly reduced price from other carriers, particularly low-cost carriers, flying the same route. Martín et al. (2011) noted that frequent flyer passengers who are not paying for their own tickets are willing to pay around EUR 100 for more leg room, while the same passengers were only willing to pay EUR 14 when they were paying for the ticket out of their own pocket.

2.4.2 Accounting for Frequent Flyer Programs

According to Unsal (2018), frequent flyer miles can be categorized under cryptocurrencies, which can be used as money substitutes as another form of currency. It is for this reason, plus the fact that revenues typically occur before the costs in the airline industry, that the accounting of frequent flyer programs has some particular characteristics.

First, public and private enterprises in the United States use generally accepted accounting principles (GAAP), whereas the rest of the world primarily use International Reporting Financial Standards (IFRS). In turn, because of these bi-dimensional accounting methods, the recording and reporting of loyalty programs have different approaches globally as well. Under GAAP rules, a loyalty program operator can use the incremental cost method to determine the level of provision that should be made for the loyalty currency. According to Franklin (2012), the incremental cost method recognizes a liability for the marginal cost of providing air transportation to eligible award passengers (for example, the cost of flying one additional passenger in a seat that would otherwise have been empty). Because the incremental cost of an award seat can be low, the resulting provision will also be low.

Conversely, under IFRS rules, and more specifically IFRIC 13, the operator must use the exact value of the award ticket rather than the incremental cost, and instead of entering a provision, the revenue associated with the travel component of the miles must be deferred until the miles have been redeemed (hence the name deferred revenue model). Regarding air miles, when a mile is earned by a member on the airline or a participating program partner, it triggers an increase in deferred revenues. Awarding the mile to the member on behalf of the airline or its partner involves committing to a future obligation for the airline; hence, the revenue associated with that mile is deferred as a liability (like revenue received in advance). Alternatively, it is only when the airline delivers its promise or the mile has expired that the associated revenue can be recognized. Therefore, because the company does not want an uncontrolled liability on its balance sheet, some airlines still implement expiration dates with their mileage awards. However, as already noted, most carriers based in the United States halted mileage expiration practices due to the high level of competition in the market.

In another application, revenue can be recorded immediately after a mile is earned. In this instance, marketing revenue can be described as part of the selling price of a mile that partners are willing to pay to be associated with the program brand and the airline. The argument for this is that once the mile is earned, the partnership has delivered the association obligations; thus, the marketing revenue component can be recognized. Qantas (2018) declared that “Frequent flyer marketing revenue associated with the issuance of frequent flyer points is recognized when the service is performed.” American Airlines (2016) stated that in 2013, it recorded revenue of approximately $31 million due to the change in the marketing component value, which led it to defer less revenue for miles sold to non-air partners.

The accounting methodology of airline miles has a huge impact on the revenue declaration for an airline. For example, Alaska Airlines (2016) indicated that shifting 1% of the cash proceeds from marketing deliverables to travel deliverables would defer the timing of revenue recognition by approximately $8. Therefore, operating under IFRIC 13, standard is necessary in the US market. But regarding the other major carriers that are operating globally, they can use different methodologies in their accounting system which they can easily report the results of the airline mile programs the way they want.

For frequent flyer programs operating under IFRIC 13, the amount of deferred revenue must be based on the fair value to the member, not the airline's cost of redemption. Therefore, the previously stated approach to using marginal cost is no longer allowed, resulting in significantly higher deferred revenues. IFRIC 13 states that the fair value is the amount for which the award credits can be sold separately. Programs are also allowed to reduce fair value by the portion of miles that are expected to never be redeemed. Cathay Pacific (2018) noted the following in its annual report: "Breakage, the proportion of points that are expected to expire, is recognized to reduce standalone selling price and is determined by some assumptions, including historical experience, future redemption pattern, and program design" (p. 117).

According to de Boer (2017), in either case, the net income of the airline is reduced by the liability it is incurring. However, the amount of liability will typically be more considerable under the deferred revenue model than under the incremental cost approach. Regarding redemptions, under the deferred revenue approach, airlines will recognize deferred revenue when the miles are redeemed. In contrast, under the incremental cost approach, there will be no impact on net income once the prediction of the cost was accurate. In the long run, the net outcome of both approaches should be the same, the only difference being the timing of the recognition of both expenses and revenues.

2.5 Measuring the Effectiveness of Frequent Flyer Programs

Although airline frequent flyer programs are considered by some to be the most successful marketing programs the airline industry has ever witnessed, some academic researchers and practitioners argue that these programs offer award seats or upgrades which amount overly expensive gifts from the airline. As such, offering these award seats leads to lost revenue for the airline. According to Brunger (2013) and Unsal (2018), airline loyalty programs are particularly controversial regarding most revenue management departments' viewpoints, which dislike allocating "free" award seats.

Airline loyalty programs were first launched to create loyalty to a specific airline, but as the industry continuously evolves, revenue management departments want to reserve the seats for paying passengers; however, airline marketing departments can give the seats away to loyal passengers. In this instance, measuring the effectiveness of a loyalty program becomes an important decision regarding the costs related to running the program and the returns on investment the program provides to the financial results.

In measuring the effectiveness of an airline loyalty program, it is important to consider two different approaches. The literature mainly focuses the first approach focusing on the positive returns from a loyalty program, such as improved share of wallets, increased willingness to pay, and similar dimensions. The second approach focuses on indirect costs, and more specifically on the costs associated with flight awards. The direct cost items like overhead and rent associated with the airline loyalty programs are more an indicator of how efficiently the programs are run, but are not necessarily indicative of how effective the frequent flyer program is at addressing its stated objectives. Also, given the nature of non-flight awards, there is no ambiguity around their cost to the airline. Therefore, this section of the literature review focuses on the cost of air awards, which continues to attract a large amount of debate among professionals in the airline sector. A significant body of research exists in the academic literature tackling the question of what constitutes loyalty program effectiveness in the airline sector.

Early research by Dowling and Uncles (1997) reasoned that a customer loyalty program can only be beneficial in any of the following four situations: the program directly supports the customer value proposition, relationship building adds to perceived value, lifetime customer value is high, and customer retention costs are less than acquisition costs. Nunes and Drèze (2006) argued that there are five goals that loyalty programs can realistically serve: keeping customers from defecting, winning a greater share of wallet, prompting customers to make additional purchases, yielding insight into customer behavior and preferences, and turning a profit. Berman (2006) also noted that an effective loyalty program could provide access to important information on consumers and consumer trends, allow the airline to develop a greater ability to target special consumer segments, increase customer loyalty, lower customer price sensitivity and create a stronger brand attitude.

In another study, McCall and Voorhees (2010) designed a model that identified both the drivers of a program's effectiveness and the outputs of program effectiveness. They identified three main drivers: the structure of the loyalty program (including tiers), the structure of the awards (including the award type and frequency), and what they call customer factors, which includes the fit of a customer with the program. On the outcome side, they identified seven ways in which the effectiveness of loyalty programs can be measured. The first measure is increased purchased frequency. As the name suggests, it is a measure of how often customers buy a particular product or frequent a certain business.

The second measure is decreased customer price sensitivity. This effect is often ascribed to loyalty programs when members of the program tend to spend more with the airline or where they are less receptive to offers from competitors. The third element is customer advocacy, which shows the extent to which customers are brand ambassadors of a particular product. The fourth dimension is extended relationship length. It measures how long a customer stays with a certain company. The fifth one is the key-share of wallet. Recognizing that consumers have a limited budget available for purchases, this looks at the share a certain provider can secure rather than growing the budget. The sixth factor is developing a consumer community and connectedness. The seventh element is better firm performance. In concluding their paper, the authors stated that despite the proliferation of loyalty programs, the evidence regarding their effectiveness remains mixed and is often inconsistent.

Kopalle et al. (2009) found that members were quite heterogeneous in responding to airline loyalty programs. Their research underscored the importance of elite benefits because the "service-oriented" segment (which comprised the vast majority of their sample population) finds a frequency award not worth the effort, yet highly values the elite tier benefits. The authors reasoned that these findings are likely because these program members were frequent flyers, and more flights (even free) are not very attractive to this segment. Kopalle et al. (2009) also noted that the hassle cost of finding a redemption seat is very high. However, they also found that getting close to an award, along with having successfully redeemed miles for an award, has a positive impact and increases the purchase likelihood for paid flights.

Dolnicar, Grabler, Grün, and Kulnig (2011) found that membership in airline loyalty programs, price, the status of being a national carrier, and the reputation of the airline as perceived by friends are the variables that best discriminate between loyal and disloyal travelers to the airline. In another study, Dekay et al. (2009) compared airline loyalty programs with hotel loyalty programs by surveying hotel guests. They found that airline loyalty programs at that time had achieved considerably greater awareness among travelers than hotel loyalty programs. Also, the authors concluded that frequent flyer miles were more popular as a currency than hotel loyalty points.

Seelhorst and Liu (2015) showed that frequent flyer program membership is a major driver of itinerary choice in the United States. Except for Southwest Airlines (and the aforementioned frequent flyer program membership), airlines were effectively considered to be commodities, thereby leaving attributes such as price, number of connections, and on-time performance, to be considered key drivers of itinerary choice.

Jiang and Zhang (2016) found that membership in an airline loyalty program did not induce higher retention of members for either business or leisure travel. They concluded that, regarding customer loyalty, frequent flyer programs have largely been a failure for the four major airlines. Furthermore, according to the authors, only 5% of the surveyed passengers chose an airline for its loyalty program. However, their study results were highly related to Chinese aviation market characteristics, where the elasticity of demand for air travel is relatively lower than in the continental United States and loy alty programs are much more effective in the continental United States than in China.

Although academic research is limited by its design (sometimes providing snapshots, usually obtained in an environment that is controlled with precise conditions), it does offer the most empirical view of program effectiveness. The single most researched area has been the effect of loyalty programs on the price sensitivity of the program's members. Although this could indicate that a reduction in price sensitivity is a natural outcome of loyalty program membership, it lends itself well to scientific experiments.

2.5.1 Loyalty Programs and Price Sensitivity

Hess, Adler, and Polak (2007) demonstrated that among various groups of travelers (business, holiday, and visiting friends/relatives), the business segment stood out for its willingness to pay $125 more to fly on an airline, where they held an elite frequent flyer account. Within the context of this debate, revenue management debaters contend that the purpose of airline loyalty programs is to attract higher-yield passengers for premium services. As many travel for business and are therefore late bookers, it is logical that they pay higher fares and that increment should not be ascribed to frequent flyer program membership. But the leisure passengers are also another important factor for the airline. As most of the leisure passengers are very price sensitive, they tend to accumulate air miles in long term in order to fly for expensive routes with an award ticket. This type of passengers do not pay a premium fare to the airline, but their mileage accumulation provides a constant cash flow to the airline. The constant cash flow sometimes becomes a crucial revenue part for the airline especially during crisis times when the demand to the business travel becomes significantly lower.

In Lederman’s (2008) study, the author demonstrated how airlines that are dominant at their own hub could charge higher fares by investigating the effect of partner airlines (that are not dominant at the hub) on fares, following the conclusion of a frequent flyer partnership agreement. This study concluded that loyal airline customers were willing to pay up to 25% more to fly on their member airlines.

In another study, Behrens and McCaughey (2015) found that after redesigning a frequency award program into a customer tier program, consumer surplus increased. Also, they found a causal effect on the average transaction size, purchase frequency, revenues of the sponsoring airline, and compensating variation, thereby confirming the effectiveness of the new tiering structure. Arango, Huynh, and Sabetti (2015) noted that since many airlines started offering airline co-branded credit cards, the rewards offered with the co-branded card have been proven to shift expenditures to the cards. Therefore, in addition to considering mile award earnings by flight, examining the mile earning structure of airline co-branded credit cards is another useful tool for comparing the effectiveness of airline loyalty programs.

2.6 Airline Co-Branded Credit Cards

Since the early days of airline loyalty programs, airlines have been interested in airline–bank partnerships, where passengers can earn frequent flyer miles not only by flying but also through these partnership programs. According to Wang and Hsu (2016), Continental Airlines and the Bank of Marine Midland launched the world’s first co-branded credit card program in 1986. One year later, in 1987, American Airlines and Citibank signed a co-branded credit card agreement that still exists today.

Although there had been earlier credit card partnerships with airlines (such as with Club Rewards from Diners Club in 1985), when the Citibank AAdvantage card was launched for the first time, the card carried the brand of the airline loyalty program. According to de Boer (2017), since the beginning of American Airlines co-branded credit card partnership, co-brand credit card agreements have become the single most important revenue contributor to airline loyalty programs. According to de Boer and Gudmundsson (2012), airline co-branded credit cards typically carry the name of the airline or the airline's loyalty program in addition to the credit card or bank brand.

The importance of airline credit card revenues is highly significant. Delta Air Lines (2017) stated that by 2021, it expects to achieve a $4 billion annual contribution from its partnership with American Express. Similarly, the effect of co-branded credit cards can be significant for the card issuing bank as well. According to American Express (2017), their Delta SkyMiles cards accounted for approximately 7% of worldwide billed business for American Express in 2016, and approximately 20% of worldwide card member loans as of December 31, 2016.

The most important question related to airline co-branded credit cards is why they have been so successful in this industry. Wilsher (2007) identified four key reasons for the success of these credit cards. The first is the acquisition of high-value target customers, who tend to be common with and are frequent users of airline loyalty programs. According to Ching and Hayashi (2010), consumers with higher incomes and educational levels are more likely to hold rewards cards. This group is attracted by travel as a redemption category. Even if these customers are not normally in favor of using credit cards, to receive highly valued rewards, such as free first-class travel, passengers tend to spend more on co-branded credit cards.

The second reason that Wilsher (2007) noted was that the card issuer increased card member usage and engagement. Spend with airline co-branded cards tends to significantly exceed that of regular cards. Research by Arango et al. (2015) showed that having a reward feature raises the likelihood of paying with a credit card, ranging from 3.6–12.8% points for transactions of $25 or more, at the expense of both debit card and cash payments. The third factor is improving product attractiveness, and the fourth factor is enhancing card member satisfaction. To achieve these goals, the SkyMiles credit card from Delta Air Lines (2020) proposed waived baggage fees and free miles upon application.

To understand the reasons for successful co-branded credit card operations for an airline, it is essential to discuss them from each individual stakeholder perspective: the passengers, the airline loyalty program, and the credit card issuing bank. Starting from the passenger's viewpoint, two elements help explain the appeal of the co-branded credit card. The core of the value proposition is built around the ability to earn frequent flyer miles on credit card expenditures because it offers an array of earning opportunities associated with the spending behavior of the member.

According to de Boer (2017), being able to earn more miles only partially explains the success of these cards. Many cards today offer more than just the ability to earn miles and include various benefits associated with the card, ranging from additional status or bonus miles to lounge access or even an actual elite (gold) tier card. The level of benefits is typically correlated with card type, where more expensive cards offer more benefits. Most programs offer different cards from those with low or zero annual fees to cards that have an annual fee but offer extensive benefits.

From the airline loyalty program perspective, the co-branded credit card generates value differently. First, there are significant direct revenues that the airline and the airline's loyalty program can generate from a co-branding deal. The main source of direct revenue is the cash flow from the sale of frequent flyer miles. Banks pay a negotiated rate per mile, which may be a function of volume. In some cases, special rates are negotiated for miles to be used on a promotional basis, such as giving a high number of miles to elite customers of both the airline and the bank. However, many contracts also offer other revenue streams. Some programs receive sign-up bonuses for each new cardholder acquired. These rewards can be significant, as the issuers are willing to invest in acquiring new members. Also, it has become increasingly common for the airline loyalty program to receive a share of the interchange fees and the interest revenues.

From another perspective, airline loyalty programs serve as a solid relationship tool for the airline and the credit card program. Furthermore, because this partnership gives frequent flyer customers another way to earn miles, it increases the earn velocity and makes the program more attractive, even for those members who fly infrequently or not at all. Finally, the co-branded credit card agreements drive marketing efficiency and effectiveness. Using the bank's marketing channels, airlines can generate significant exposure for the co-brand. In addition, with data provided by the card issuer, the airline frequent flyer programs are enabled to generate more targeted marketing.

Regarding the credit card issuer's perspective, they have multiple sources of revenue from the airline partnership. According to Arango et al. (2015), frequently awarded flyer miles are funded through the interchange fee, which is the per transaction fee charged by issuers to acquirers of card payments and passed through to merchants in a transaction discount fee. According to Rochet and Wright (2010), unregulated credit card interchange fees are typically around 12% of the transaction value, while debit card interchange fees are typically between 0 and 1%. Ching and Hayashi (2010) stated that a merchant pays different interchange fee rates for credit card trans actions; non-reward cards have the lowest fee rates, while high-end reward cards have the highest rates. The value of rewards received by cardholders in a typical credit card rewards program is about 1% of the purchase value, while in a typical debit card rewards program, it is about one-quarter of the 1%. According to Unsal (2018), the value of rewards received by airline co-branded cardholders of the Turkish Airlines Miles & Smiles credit card is as high as 42% for some international business class routes.

Another source of revenue for the banks is the fees associated with the card, including annual fees paid by the member. Annual fees vary from market to market and can be significant. In particular, when the property of a card is increased, the annual fee of the credit card also increases. However, often, the annual membership fee will not be charged to certain elite customers of the banks that have large investments through or in the bank. For example, Turkish Airlines Miles & Smiles credit card is offered by two different banks—Garanti BBVA Bank and QNB Finansbank. While the Garanti BBVA bank charges a substantial annual membership fee regardless of the customer segment with the bank (Turkish Airlines, 2020), the QNB Finansbank does not require an annual payment for its top-tier bank customers. However, the QNB Finansbank (2020) offers up to 1,100% more bonus frequent flyer miles for its elite customers.

The penetration of the co-branded credit card in the program member base varies from program to program, and the offers also significantly vary. Not every market can support a successful co-branded credit card, even if the interests of the stakehold ers are aligned. The ability to launch and maintain a sustainable co-branded credit card depends on various factors, including the adoption of credit cards as a payment mechanism. Certain markets are more predisposed to credit cards than others. For example, in the United States, customers typically have multiple credit cards accepted by numerous merchants. Other markets tend to be more skewed toward cash or debit cards or have lower levels of credit card acceptance.

According to Blockley (2009), Germany is an example of a country that has traditionally used cash and debit cards, but not credit cards. In other markets, co-brands were introduced relatively late. France, for example, has only allowed co-branding since October 2007, which is significantly later than in the continental United States. Therefore, the scope of this dissertation is focused on the continental United States, where credit card usage has been significant for decades.

As with Turkish Airlines, American Airlines, which had a longstanding agreement with Citibank, entered into another agreement with Barclays Bank in the United States in 2016. Both banks have exclusive access to specific channels. Citibank offers its cards to new customers through multiple exclusive channels, such as digital, mobile, direct mail, and through the Admirals Club lounges, while the Barclay card is offered to new customers in airports and exclusively during flights. Natural markets in which co-branded credit cards are launched include the airline's home market and markets outside of the home territory where there is significant demand. Banchik (2012) revealed that the implications of a limited market presence in foreign markets can manifest differently, including lower margins and the absence of exclusivity provisions. Furthermore, in an alliance or partnership setting, launching a competing co-branded credit card in the partner's home market may induce friction, which will yield an unsuccessful operation. For example, Lufthansa offered the Miles & More credit card partnering with a Turkish bank, where Turkish Airlines also offered its credit card. Because both of these cards accrued the same Star Alliance frequent flyer miles, Lufthansa's Miles & More credit card partnership investment had an unsuccessful ending.

2.6.1 The Difference Between Direct (Co-Branded) and Indirect (Transfer) Credit Card Programs

Blockley (2009) distinguished between direct and indirect card programs. Some card issuers run proprietary loyalty programs, letting cardholders accumulate their own currency, such as with American Express Membership Rewards and Diners Club Rewards points. The members of these card programs can redeem their points for various items, including a conversion from proprietary currency into frequent flyer miles. To redeem these rewards, cardholders must convert to miles, and therefore, they cannot directly redeem miles in the airline frequent flyer program, hence the name indirect earning.

Under direct earnings, the proprietary points are automatically converted to the selected airline's frequent flyer miles. From the perspective of airline programs, direct earning is more attractive because the airline gets the full number of miles (and a steady cash flow) and also enjoys the resulting margin and breakage. However, according to Armstrong (2017), the total financial partnership revenues generated from transfers (indirect earn) have realized that co-branded airlines have an average growth rate of 21.9% versus 4.9% for co-branded credit cards. According to that study, co-branded credit cards and transfer options have distinct profiles. Co-branded credit cards were characterized by 11% breakage versus 3% for transfer, which reflects member behavior for miles transferred when only the members make an award booking. Furthermore, transfers tend to be used more for premium redemptions, around 26% versus 14% for co-branded credit cards. Armstrong (2017) identified that offering transfer options could induce the cannibalization of the existing co-branded portfolio, which can be mitigated by ensuring that the co-brand maintains a superior value proposition by offering various types of services to customers.

The airline co-branded credit cards represent a highly contested segment for the reasons already outlined. Even indirect earning cards (where the bank's currency can be converted into frequent flyer miles) represent a highly competitive environment where banks are willing to invest heavily in perks and sign-up bonuses. Accord ing to Surane and Son (2016), the JPM organ Sapphire Reserve credit card was introduced in August 2016 with a 100,000 point sign-up bonus for customers who spent $4,000 in the first three months, thereby reducing the bank's profits from $300 million to $200 million.

Regarding these airline co-branded credit card partnerships, five different airlines were selected for the research. All the selected carriers have direct programs in which banks are required to purchase air miles directly from the airline based on customer credit card transactions made periodically.

CHAPTER III
Selection of Airlines

In this dissertation, the frequent flyer loyalty programs of leading carriers registered in the United States will be compared regarding program specifications that require a certain level of official credit card expenditure to fly free in one of the reserved seats for each particular flight route. For this study, American Airlines, Delta Air Lines, United Airlines, Alaska Airlines and Hawaiian Airlines have been selected. All of the selected airlines market both domestic U.S. and international route tickets via their partner airlines for various cabin categories. In particular, Delta, American and United have extensive international route structures, and they are considered the big three full-service carriers in the U.S. aviation market. According to the statistics website Statista (2019), these three airlines collectively comprised an average of 45% of the U.S. domestic travel market between October 2018 and September 2019. Their collective market share makes their inclusion essential to any comparison of loyalty programs within the U.S. market. The other selected airlines are Hawaiian and Alaska airlines, which also have full-service business class cabin features and mileage agreements with other major international carriers.

A second factor contributing to the inclusion of these five airlines in this study is their participation in the significant global alliance structure; emphatically, the three selected airlines were founding members of the three global alliances existing today. Hawaiian and Alaska also have strong bilateral agreements with major international airlines. American Airlines was a founding member of the Oneworld Alliance, which was founded in 1999 by the airline, according to the alliance website (Oneworld, 2019). The Oneworld alliance has seen significant success since its inception, and it was awarded seven leading international airline alliance titles in 2016. These awards included an on-time performance service award for the fourth year in a row, which indicates its operational efficiency; thus, American Airlines is a good benchmark against which to evaluate the other airline loyalty programs in this study.

Similarly, Delta Air Lines was a founding member of the SkyTeam Alliance in 2000. Finally, United Airlines was a founding member of the Star Alliance in 1997, and today, the airline is among the most successful in the United States regarding major legacy carriers. Although American, Delta Air Lines, and Southwest are arguably more successful in major key performance indicators, such as market share, United Airlines has preserved its place as the fourth major contributor to domestic market share in the United States, with an average market share of 15% from October 2018 to September 2019, according to Statista (2019). Hence, its inclusion in this study is essential. Detailed information regarding airline selections is given for each airline separately in the following subsections.

3.1 Delta Air Lines

Delta Air Lines' primary focus is serving as a passenger airline, presenting scheduled air transportation for passengers and cargo in the United States ("U.S.") and around the world. Delta Air Line's route structure is centered around major huge hubs in key markets at airports in Amsterdam, Atlanta, Boston, Detroit, London-Heathrow, Los Angeles, Mexico City, Minneapolis-St. Paul, New York-LaGuardia, New York-JFK, Paris-Charles de Gaulle, Salt Lake City, São Paulo, Seattle, Seoul-Incheon, and Tokyo-Narita. Each of these operations includes flights strategically connected to international cities and to different hubs or key focus cities.

Delta Air Line's success is supported by an intensive fleet of aircraft that allows for different flight amenities and services capabilities. Assisted by its international joint ventures and alliances with different foreign airlines and membership in SkyTeam, and agreements with multiple domestic, regional carriers functioning as Delta Connection, Delta Air Lines can deliver different choices regarding different prices to clients worldwide.

Delta Air Lines has a retail-oriented, merchandised method of distribution with well-defined and differentiated products for its customers. Delta One, Delta Premium Select, First Class, and Delta Comfort+ include varying premium services and offerings, while Main Cabin and Basic Economy permit various pre-travel flexibility. Furthermore, Delta Air Lines is investing in obtaining a new, more environment-friendly plane with elevated top rate seating to substitute older aircraft (Delta, 2020).

Delta Air Lines' global alliance relationships are an essential part of its commercial enterprise, as they enhance Delta's access to global markets and allow Delta to market globally integrated air transportation services. The most substantial of these preparations are business joint ventures comprising joint sales and marketing coordination, co-location of airport amenities, and other commercial cooperation arrangements. Delta Air Line's alliance preparations also include reciprocal code-sharing and reciprocal loyalty application participation, and the airport lounge receives admission to arrangements. These alliance relationships may also extend to other areas, such as airport floor handling arrangements, aircraft maintenance outsourcing, and joint procurement. Out of code-share agreements with Sky Team Global Airline Alliance, Delta Air Lines has the following joint venture agreements globally:

•Aeromexico—Delta owns 49% share of Mexican flag provider Aeromexico.

In 2015, Delta and Aeromexico applied for an immunized joint venture. After two years, the joint venture was permitted with two conditions: each airline had to relinquish four slot pairs at John F. Kennedy International Airport and 24 at Mexico City International Airport to rivals (both airports have slot restrictions). The joint venture began in May 2017, at which time Aeromexico moved to Delta Gates at each Kennedy and Los Angeles International Airport (Delta, 2020).

•Air France/KLM/Alitalia—Delta, as the successor to Northwest Airlines, has a joint transatlantic venture with Air France–KLM and Alitalia. The program coordinates transatlantic operations, which include ticket pricing, schedules, capacity, and revenue (Delta, 2020).

•Korean Air—In 2016, Delta and Korean Air started out to lay the groundwork for a transpacific joint venture to compete against those between American Airlines and Japan Airlines, and United Airlines and All Nippon Airways. They aimed to enlarge belly cargo cooperation and provide benefits to its customers across route networks in the transpacific market. This joint venture offers Delta and Korean Air's shared clients seamless entry to more than 290 locations in the Americas and more than 80 locations in Asia. This joint venture was formally launched in May 2018, exactly 12 months after the joint venture with Aeromexico began (Delta, 2020).

•LATAM Airlines Group—In September 2019, Delta announced its plans to purchase 20% of LATAM Airlines Group for $1.9 billion, which would increase Delta's presence in Latin America. In associated transactions, Delta was paying to withdraw LATAM from Oneworld and acquired the undelivered Airbus A350 XWB aircraft from the LATAM order book alongside two planes leased externally via LATAM. The acquisition of the stake was once accomplished on December 30, 2019 (Delta, 2020).

•Virgin Atlantic—On December 11, 2012, Delta introduced that it would collect the 49% stake in Virgin Atlantic held through Singapore Airlines for $360 million. The two airways operate a whole of 31 round-trip flights between the UK and North America, including nine daily round-trip flights between London and New York City airports (John F. Kennedy International Airport and Newark), with fees shared between the two airlines (Delta, 2020).

•Virgin Australia—In 2017, Delta introduced a joint venture with Virgin Australia, strengthening its transpacific community and permitting the carrier to add direct flights between Australia and the United States.

•WestJet—Delta Air Lines and Canadian airline WestJet function as a code-share settlement on select routes in North America. On July 19, 2018, WestJet and Delta Air Lines signed a ten-year agreement. The airlines also aligned their generic flier applications, which were co-located at key hub airports.

Delta Air Lines SkyMiles ® frequent flyer program is designed to maintain and extend visitor loyalty by incentivizing customers to extend the journey on Delta. The loyalty program allows members to earn mileage credit for tour awards by flying on Delta, its regional carriers, and different collaborating airlines.

Mileage credit may also be earned using certain services presented by program participants, such as credit card companies, hotels, and vehicle rental agencies. Also, individuals may buy mileage credits. Currently, miles earned within Delta Air Lines loyalty program do not expire. However, this issue impedes the airline accounting department as debts to customers started to increase because of unredeemed air miles. Loyalty program mileage credit is redeemable for air ser vices (including upgrades) on Delta and code-share airlines, for membership in Delta Sky Clubs ® lounge access, and for other awards. Delta Air Lines provides last-seat availability for upgrade awards on selected flights (including most Delta Connection flights). In 2018, 8.2% of total miles flown on Delta were from award travel free seats. The same year, 17.2 million award redemptions occurred in the frequent flyer program (Delta, 2020).

Delta Air Lines financial information regarding the 2017–2019 period is given in Table 3.1 below:

Table 3.1

Delta Air Lines Financial Information in millions 2017-2019

Financial data	2017	2018	2019
Operating revenue	$4.113.800	$4.443.800	$4.700.700
Passenger	$3.694.700	$3.975.500	$4.227.700
Cargo	$74.400	$86.500	$75.300
Others	$344.700	$381.800	$397.700
Operating costs	$3.517.200	$3.917.400	$4.038.900
Aircraft fuel	$675.600	$902.000	$851.900
Salaries and related costs	$1.005.800	$1.074.300	$1.122.500
Regional carrier expense	$346.600	$343.800	$358.400
Aircraft maintenance materials and outside repairs	$159.100	$157.500	$175.100
Passenger commissions and other selling expenses	$182.700	$194.100	$199.300
Contract services	$210.800	$217.500	$264.100
Depreciation and amortisation	$222.200	$232.900	$258.100
Landing fees and other rents	$150.100	$166.200	$176.200
Passenger service	$112.300	$117.800	$125.100
Aircraft rent	$35.100	$39.400	$42.300
Profit sharing	$106.500	$130.100	$164.300
Ancillary businesses and refinery	$149.500	$169.500	$124.500
Operating profit (loss)	$596.600	$526.400	$661.800
Net profit (loss)	$320.500	$393.500	$476.700
Total assets	$5.371.100	$6.027.000	$6.452.900
Cash and cash equivalents	$181.400	$156.500	$288.200
Total liabilities	$4.118.100	$4.659.300	$4.908.900

Source: Capa (2020)

3.2 American Airlines

American Airlines Group Inc. (AAG), a Delaware corporation, is a multi-branded aviation holding company whose subsidiaries are American Airlines Inc. (American), Envoy Aviation Group Inc. (Envoy), PSA Airlines Inc. (PSA), and Piedmont Airlines Inc. (Piedmont). AAG was shaped in 1982 below the title AMR Corporation (AMR) as the parent business enterprise of American, which was founded in 1934.

American Airlines operates an average of almost 6,700 flights per day to nearly 350 destinations in more than 50 countries. As of December 31, 2018, the airline operated 956 mainline aircraft supported by their regional airline subsidiaries and third-party regional carriers, which provided an additional 595 regional aircraft (American Airlines, 2020). American Airlines is a founding member of the OneWorld® Alliance, whose participants serve more than 1,000 locations with about 14,250 daily flights to over 150 countries (OneWorld, 2020). See below for further dialogue on the Oneworld Alliance and other agreements with domestic and international airlines.

American Airlines has mounted a transatlantic joint venture agreement with British Airways, Iberia, and Finnair and, separately, a transpacific JBA with Japan Airlines, each of which has been granted antitrust immunity. These joint venture agreements enable American Airlines to cooperate on flights between precise locations and enable pooling and sharing of positive revenues and costs, better loyalty program reciprocity, and cooperation in other areas. Accordingly, American and its joint enterprise partners obtained regulatory approval to enter into these joint venture and cooperation agreements (American Airlines, 2020).

American Airlines loyalty program, AAdvantage, was established to develop passenger loyalty by offering awards to travelers for their continued patronage. AAdvantage participants earn mileage credit by flying on American Airlines and any other Oneworld partner airline or different associate airlines. Participants also earned miles using the offerings from various program participants, such as the Citi and Barclays co-branded credit cards. All journey on eligible tickets counts toward qualification for elite status in the AAdvantage program. Mileage credits are redeemable for an award or upgraded flight on American Airlines and partners. A member's mileage credit balance does not expire once that member has any kind of qualifying undertaking within an 18 month periods. Elite participants receive extra benefits from the AAdvantage program, including complimentary upgrades, checked bags, and Preferred and Main Cabin Extra seats, along with priority check-in, security, boarding, and baggage. During 2018, passengers redeemed approximately 13 million awards within the airline and its partners. Approximately 7.6% of 2018 total revenue passenger miles flown have been obtained from award travels (American Airlines, 2020).

American Airlines financial information regarding the 2017–2019 period is given in Table 3.2 below:

Table 3.2

American Airlines Financial Information in millions 2017-2019

Financial data	2017	2018	2019
Operating revenue	$4.220.700	$4.454.100	$4.576.800
Passenger	$3.613.300	$4.067.600	$4.201.000
Cargo	$80.000	$101.300	$86.300
Others	$527.400	$285.200	$289.500
Operating costs	$3.814.900	$4.188.500	$4.270.300
Aircraft fuel	$612.800	$805.300	$752.600
Wages, salaries and benefits	$1.181.600	$1.225.100	$1.260.900
Regional expenses	$654.600	$713.300	$750.100
Maintenance, materials and repairs	$195.900	$205.000	$238.000
Landing fees and other rentals	$180.600	$190.000	$205.500
Aircraft rent	$119.700	$126.400	$132.600
Selling expense	$147.700	$152.000	$160.200
Depreciation and amortisation	$170.200	$183.900	$198.200
Operating profit (loss)	$405.800	$265.600	$306.500
Net profit (loss)	$191.900	$141.200	$168.600
Total assets	$5.139.600	$6.079.200	$5.999.500
CASH	$29.500	$27.500	$28.000
Total liabilities	$4.747.000	$6.096.100	$6.011.300

Source: Capa (2020).

3.3. United Airlines

United Airlines Holdings, Incorporated, is the parent enterprise whose primary wholly owned subsidiary is United Airlines. The company transports both passengers and cargo primarily in North America and to locations in Asia, Europe, Africa, the Pacific, the Middle East, and Latin America. United Airlines and its regional carriers operate more than 4,900 flights a day to 362 airports throughout six continents (United Airlines, 2020). All the company's hubs are located in major cities, contributing to a vast amount of "origin and destination" traffic. The hub-and-spoke system permits United to transport passengers between a giant range of destinations with extensively greater widespread service than if each route were served directly.

United Airlines is a member of Star Alliance, a globally integrated airline network, and the largest and most complete airline alliance in the world. As of January 1, 2020, Star Alliance carriers served nearly 1,300 airports in 195 nations, with more than 19,000 daily departures (Star alliance, 2020). United has various bilateral commercial agreements with Star Alliance members, addressing, among other things, reciprocal earning and redemption of established flyer miles and access to airport lounges.

In addition to the alliance agreements with Star Alliance members, United Airlines currently maintains independent advertising and marketing alliance agreements with different air carriers, which include Aeromar, Eurowings, Aer Lingus, Air Dolomiti, Azul Linhas Aéreas Brasileiras S.A. ("Azul"), Cape Air, Edelweiss, Hawaiian Airlines, Olympic Air, Boutique Air, Silver Airways, and Vistara. In addition to the marketing alliance agreements with air partners, United Airlines also gives a train-to-plane code-share and frequent flyer alliance with Amtrak from Newark on selected city pairs in the northeastern United States.

United Airlines also participates in four joint venture agreements. One of the agreements made with Air Canada and the Lufthansa Group, which includes Lufthansa and its affiliates, Austrian Airlines, Brussels Airlines, Eurowings, and SWISS, covering transatlantic routes. Another agreement was made with the ANA overlaying transpacific routes. United Airlines also made an agreement with Air New Zealand covering routes between the United States and New Zealand. A final agreement signed with Avianca and Copa Airlines covers routes between the United States and Central and South America besides Brazil.

United Airlines' MileagePlus frequent flyer program builds client loyalty by presenting awards, benefits, and services to system participants. Members enrolled in this program can earn miles for flights on United, United Express, Star Alliance contributors, and other airlines that participate in the program. Members can also earn miles by purchasing items and services from United's community of non-airline partners, such as home and worldwide credit card issuers, retail merchants, hotels, and auto rental companies. This vast number of partnership agreements enables customers to easily redeem miles for award, discounted, or upgraded travel, and non-travel awards globally.

United has an agreement with JPMorgan Chase Bank, N.A. ("Chase"), pursuant to which members of United's MileagePlus loyalty scheme who are residents of the United States can earn miles for making purchases using a MileagePlus co-branded credit card issued through Chase (the "Co-Brand Agreement"). The co-brand agreement also allows for joint advertising and another guide for the MileagePlus deposit card and provides Chase with other advantages, such as permission to market to United's consumer database.

In 2019, about 6.1 million MileagePlus flight awards were used on United and United Express. These awards represented 7.2% of the United's total revenue passenger miles. Total miles redeemed for flights on United and United Express comprised class-of-service upgrades, representing approximately 87% of the total miles redeemed. In addition, except miles redeemed for flights on United and United

Express, MileagePlus program partners redeemed miles for approximately 2.2 million awards (United Airlines, 2020).

United Airlines financial information regarding the 2017–2019 period is given in Table 3.3 below:

Table 3.3

United Airlines Financial Information in millions 2017-2019

Financial data	2017	2018	2019
Operating revenue	$3.778.400	$4.130.300	$4.325.900
Passenger	$3.446.000	$3.770.600	$3.962.500
Cargo	$111.400	$123.700	$117.900
Others	$221.000	$236.000	$245.500
Operating costs	$3.411.300	$3.801.100	$3.895.800
Aircraft fuel	$691.300	$930.700	$895.300
Salaries and related costs	$1.094.100	$1.145.800	$1.207.100
Regional capacity purchase	$223.200	$260.100	$284.900
Landing fees and other rentals	$224.000	$235.900	$254.300
Aircraft maintenance materials and outside repairs	$185.600	$176.700	$179.400
Depreciation and amortisation	$214.900	$224.000	$228.800
Distribution expense	$143.500	$155.800	$165.100
Aircraft rent	$62.100	$43.300	$28.800
Operating profit (loss)	$367.100	$329.200	$430.100
Net profit (loss)	$214.400	$212.900	$300.900
Total assets	$4.234.600	$4.477.200	$5.261.100
Cash and cash equivalents	$148.200	$169.400	$276.200
Total liabilities	$3.361.200	$3.477.700	$4.113.000

Source: Capa (2020).

3.4 Alaska Airlines

The fourth airline observed in this research is Alaska Airlines. Alaska Airlines was ranked fifth regarding its market share in 2019 by Statista (2019). The airline has a fascinating history, beginning with its inception in 1932, according to the company website's history of Alaska Airlines by decade (Statista, 2019). The airline has grown significantly and has steadily built its route structure over the years, and today, it is the fifth largest U.S. domestic air carrier. Furthermore, Alaska Airlines (2020) announced that the airline group will join the OneWorld Alliance in 2021.

Alaska Air Group is a Delaware corporation incorporated in 1985 that operates two airlines, Alaska and Horizon. Alaska was incorporated in 1937 in the state of Alaska. Horizon is a Washington corporation that began service in 1981. Virgin America, which was once a member of Air Group, was acquired in 2016 until 2018, when Alaska and Virgin America blended operating certificates to become a single airline and legally merged into a single airline. The company additionally includes McGee Air Services, an aviation service provider that was set up as a wholly owned subsidiary of Alaska in 2016. Alaska and Horizon function as separate airlines with individual commercial enterprise plans, competitive factors, and financial risks. Together with Alaska Airline's regional airline partners, the airline serves one hundred fifteen destinations with over 1,300 daily departures via an expansive network throughout the U.S., Mexico, Canada, and Costa Rica (Alska Airlines, 2020).

Alaska Airlines' bilateral agreements among partners fall into three one of a kind categories: frequent flyer, code-share, and interline agreements. Frequent flyer agreements allow airlines Mileage Plan members to earn mileage credit and redeem one of Alaska's 18 domestic and international partner airlines. These code-share agreements allow Alaska Airlines to market additional flights, and the nature of the agreements differs depending on the carrier involved. For example, in a free sale arrangement, the advertising and marketing carrier sells the operating carrier's inventory barring any restriction, whereas in a block-space arrangement, a constant number of seats are sold to the advertising carrier using the operating carrier.

The interchangeability of the flight code between carriers gives a higher selection of flights for customers, alongside elevated flexibility for mileage accrual and redemption. These interline agreements enable airlines to concurrently provide a competitive, single-fare itinerary to customers traveling through more than one carrier to an ultimate destination. An interline itinerary provided by a single airline cannot provide flights to the entire world. So, airlines need to make partnership agreements among various airlines to enrich their flight network. Therefore, for issuing a ticket with multiple operating airlines, the fares accrued from passengers are prorated and disbursed to interline partners following preexisting agreements between the carriers. Table 3.4 presents Alaska Airlines partnership agreements with other airlines.

Table 3.4

Alaska Airlines Partnership Agreements.

		Codeshare	
	Frequent Flyer Agreement	**Alaska Flight # on Flights Operated by Other Airline**	**Other Airline Flight # on Flights Operated by Alaska or CPA Partners**
Major U.S. or International Airlines			
Aer Lingus	Yes	No	No
American Airlines	Yes	Yes	Yes
British Airways	Yes	No	Yes
Cathay Pacific Airways	Yes	No	Yes
Condor Airlines[(a)]	Yes	No	No
EL AL Israel Airlines	Yes	No	Yes
Emirates	Yes	No	Yes
Fiji Airways[(a)]	Yes	No	Yes
Finnair	Yes	No	Yes
Hainan Airlines	Yes	No	No
Icelandair	Yes	No	Yes
Japan Airlines	Yes	No	Yes
Korean Air	Yes	No	Yes
LATAM	Yes	No	Yes
Qantas	Yes	Yes	Yes
Singapore Airlines	Yes	No	No
Regional Airlines			
Ravn Alaska	Yes	Yes	No
PenAir[(a)]	Yes	Yes	No

(a) These airlines do not have their own frequent flyer program. However, Alaska's Mileage Plan™ members can earn and redeem miles on these airlines' route systems.

Source: Alaska Airlines (2020).

Alaska Airlines Mileage Plan™ offers a comprehensive suite of frequent flyer benefits. Miles can be earned by flying on the airline or one of their 18 airline partners using an Alaska Airlines credit card or even through different non-airline partners. Alaska's widespread listing of airline partners comprises carriers related to each of the three primary international alliances, making it less complicated for their frequent flyers to earn miles and attain an elite reputation within the airline. Mileage Plan™ program participants can access a large network of over 800 international journey destinations. Furthermore, contributors can acquire up to 40,000 bonus miles upon signing up for the Alaska Airlines Visa Signature card and earn triple miles on Alaska Airlines purchases.

Alaska Airlines Visa Signature cardholders also acquire an annual associate ticket that approves individuals to purchase an additional ticket for $99 plus taxes, with no restrictions or blackout dates and a free first checked bag for up to six people traveling on the identical itinerary. Mileage Plan™ revenues, including those in the passenger revenue income assertion line item, represented approximately 13% of Air Group's whole revenues in 2019 (Alaska, 2020).

Alaska Airlines financial information regarding the 2017–2019 period is given in Table 3.5 below:

Table 3.5

Alaska Airlines Financial Information in millions 2017-2019

Financial data	2017	2018	2019
Operating revenue	$789.400	$826.400	$878.100
Passenger	$730.100	$763.200	$809.500
Freight and mail	$17.500	$19.800	$22.100
Operating costs	$668.600	$762.100	$771.800
Wages and benefits	$193.100	$219.000	$237.000
Aircraft fuel, including hedging gains and losses	$144.700	$193.600	$187.800
Aircraft maintenance	$39.100	$43.500	$43.700
Landing fees and other rentals	$46.000	$49.900	$53.100
Depreciation and amortisation	$37.200	$39.800	$42.300
Food and beverages	$19.500	$21.100	$21.400
Aircraft rent	$27.400	$31.500	$33.100
Contracted services	$31.400	$30.600	$28.900
Selling expenses	$35.700	$32.600	$31.300
Variable incentive pay	$13.500	$14.700	$16.300
Third party regional carrier expense	$12.100	$15.400	$16.600
Merger related costs	$11.600	$8.700	$4.400
Operating profit (loss)	$120.800	$64.300	$106.300
Net profit (loss)	$96.000	$43.700	$76.900
Total assets	$1.074.600	$1.091.200	$1.299.300
Cash and cash equivalents	$19.400	$10.500	$152.100
Total liabilities	$728.600	$716.100	$866.200

Source: Capa (2020).

3.5 Hawaiian Airlines

The fifth airline considered in the study is Hawaiian Airlines. Hawaiian Airlines is unique due to its network structure, which focuses on flights located around six hours of flight time from its Hawaiian home market. Its network structure targets the U.S. West Coast, the Australian, Far East, and other Pacific island markets. This network structure requires a sufficient degree of efficiency in its day-to-day operations. Hawaiian, therefore, presents a compelling case to evaluate in this study vis-à-vis other airlines with greater potential economies of scale and network structures and a much broader mix of short-, medium-, and long-haul routes and fleets.

Hawaiian Airlines engaged in the scheduled air transportation of passengers and cargo among the Hawaiian Islands (the Neighbor Island routes) and between the Hawaiian Islands and main hub airport cities in the United States (the North America routes collectively with the Neighbor Island routes, to the continental U.S., and between the Hawaiian Islands and the South Pacific routes such as Australia, New Zealand, and Asia. The airline offers continuous carrier services to Hawaii from greater U.S. gateway cities than any other airline and also furnishes approximately 180 daily flights between the Hawaiian Islands. In addition, Hawaiian operates a number of charter flights.

Hawaiian Airlines has marketing alliances with other airlines that provide reciprocal frequent flyer mileage accrual and redemption privileges and code-shares on certain flights. Table 3.6 shows the mileage agreement of the airline with its partners.

Table 3.6

Hawaiian Airlines Partnership Agreements

	Hawaiian Miles Frequent Flyer Agreement	Other Airline Frequent Flyer Agreement	Code-share—Hawaiian Flight # on Flights Operated by Other Airline	Code-share—Other Airline Flight # on Flights Operated by Hawaiian
Air China	No	No	No	Yes
American Airlines	No	Yes	No	Yes
China Airlines	Yes	Yes	Yes	Yes
Delta Air Lines	No	Yes	No	Yes
JetBlue	Yes	Yes	Yes	Yes
Korean Air	Yes	Yes	Yes	Yes
Philippine Airlines	No	No	No	Yes
Turkish Airlines	No	No	No	Yes
United Airlines	No	Yes	No	Yes
Virgin Atlantic Airways	Yes	Yes	No	No
Virgin Australia	Yes	Yes	No	Yes

Source : Hawaiian Airlines (2020)

The HawaiianMiles frequent flyer program was initiated in 1983 to encourage and enhance customer loyalty. HawaiianMiles allows passengers to earn mileage credits by flying with Hawaiian Airlines and their partners. Furthermore, members earn mileage credits for patronage with different program partners, including savings card issuers, hotels, automobile rental firms, and customary merchants. Due to agreements with various hospitality services through the state of Hawaii, HawaiianMiles participants have numerous options to spend their miles. However, most of these mileage awards are redeemed for free service on Hawaiian. The number of travel awards used for a flight on Hawaiian was approximately 685,000 in 2018. Various free journey awards as a proportion of whole revenue passengers were approximately 6% in 2018 (Hawaiian, 2020).

Hawaiian Airlines financial information regarding the 2017–2019 period is given in Table 3.7 below:

Table 3.7

Hawaiian Airlines Financial Information in millions 2017-2019

Financial data	2017	2018	2019
Operating revenue	$267.515	$283.741	$283.223
Passenger	$248.683	$260.279	$259.777
Others	$18.832	$23.462	$23.446
Operating costs	$221.111	$252.304	$250.475
Aircraft fuel	$44.038	$59.954	$11.890
Wages and benefits	$63.300	$68.472	$72.366
Maintenance materials and repairs	$21.955	$23.976	$24.977
Commissions and other selling	$12.675	$12.932	$13.022
Aircraft and passenger servicing	$14.485	$15.780	$16.428
Aircraft rent	$13.776	$12.596	$11.890
Other rentals and landing fees	$11.676	$12.690	$12.962
Depreciation and amortisation	$11.328	$13.987	$15.891
Purchased services	$11.079	$13.165	$13.157
Operating profit (loss)	$46.404	$31.437	$32.748
Net profit (loss)	$33.061	$23.320	$22.398
Total assets	$287.382	$319.665	$412.662
Cash and cash equivalents	$19.095	$26.858	$37.306
Total liabilities	$202.870	$224.865	$304.483

Source: CAPA (2020).

3.6. Selected Credit Cards for Airlines

Table 3.8 shows the credit card offerings of the five selected full-service airlines, their annual fees, and their respective mileage earning styles.

Table 3.8

Credit Card Specifications Offered by Five Select Airlines

Credit Card Type	Annual Fee (USD)	Earnings Model
Delta American Express SkyMiles Gold	95.00	1 mile per USD
Delta American Express SkyMiles Platinum	250.00	1 mile per USD
Delta American Express SkyMiles Reserve	550.00	1 mile per USD
AAdvantage Card by Citibank	450.00	1 mile per USD
AAdvantage Card by Barclays	99.00	1 mile per USD
United Mileage Plus Explorer	95.00	1 mile per USD
United Mileage Plus Club	450.00	1.5 miles per USD
Alaska Airlines Visa Signature	75.00	1 mile per USD
Hawaiian Airlines World Elite Mastercard	99.00	1 mile per USD

Adapted from Barclays Bank (2020). AAdvantage Aviator Red World Elite Mastercard. Retrieved January 24, 2020, from https://cards.barclaycardus.com/banking/cards/aadvantage-aviator-red-world-elite-mastercard/; Citi.com. (2020). Citi/AAdvantage Airline miles credit cards. Retrieved January 24, 2020, from https://www. citi.com/credit-cards/compare-credit-cards/citi.action?ID=american-airlines-aadvantage-credit-cards; United Airlines (2020). MileagePlus: Use miles. Retrieved January 9, 2020, from https://www.united.com/ual/en/us/fly/mileageplus/awards.html. Hawaiian Airlines (2020). Redeem Miles with Ease. Retrieved January 11, 2020, from https://www.hawaiianairlines.com/hawaiianmiles2/redeem; Delta Air Lines (2020). Delta SkyMiles redemption: How to use miles. Retrieved January 9, 2020, from https://www.delta.com/us/en/skymiles/how-to-use-miles/overview; Alaska Airlines. (2020, January 20). Alaska Airlines Visa Signature® Credit Card. Retrieved January 20, 2020, from https://www.alaskaair.com/content/credit-card/visa-signature

The mileage earnings model given in the table presents the minimum level of mileage earnings made by each co-branded credit card. All these cards provide additional miles through restaurants, markets, and airline-related purchases. For example Delta Sky Miles Gold credit card offers double amount of miles for restaurant and select accommodation expenditures. However, these additional miles are exempt from this study because individual credit card expenditures differ significantly from each other. Especially it is not known what percentage of credit card expenditures is entitled for earning double or triple amount of miles. This ratio is significantly different for each individual. Additionally, every selected card offers multiple award miles for selected purchases in this study. Therefore, during the research, the credit cards were compared with each other according to the minimum amount of rewards they provide customers. All selected carriers offered 1 frequent flyer mile per $1 of transactions. Only the United Mileage Plus Credit Card gives 1.5 frequent flyer miles per $1 of transactions, so it will be studied in a separate category during the simulations.

All of the selected credit cards also offer waived baggage fees. Some of them provide free airline lounge access, free seat selection or provide priority services inside the airports. Some of the co-branded credit cards offer these services to their users complimentary. But as this study is relates to the rewards obtained from credit card transactions, not the credit card itself, the monetary savings obtained from lounge access or using priority services within the airport are excluded during the research.

Overall, the airlines included in this study comprise the five major U.S. network carriers, Delta, American, United, Alaska and Hawaiian Airlines. For testing purposes, all of these carriers have multiple classes of service along with international routes. However, this chapter also outlined key differences between the carriers in their route structures and the market offerings that set up for robust FFMS testing. Attention will now shift to the methodology that underlies FFMS and the approach used for data collection, analysis, and structural model testing.

CHAPTER IV

Methodology

For this dissertation, the airline co-branded credit cards offered by five selected airlines were compared based on their mileage earning and redemption strategy implemented by each selected airline. As different airlines differ in practice, it is expected that airlines offer significantly different monetary values to their customers via airline miles. First, this research aims to compare the monetary values of airline miles offered by airline co-branded credit card programs via FFMS analysis. Second, it analyzes the effect of FFMS on airline operational revenues via SEM modeling. Therefore, only the miles earned from airline co-branded credit cards were considered for redeeming award flight tickets. All other types of earning status miles from flights and earning bonus miles for other partner services were not considered in this study because every individual has different habits and lifestyles. Without knowing the exact passenger mileage behavior via the airline mileage database, it is impossible to predict the personal mileage earning scheme for a particular airline. Therefore, for this study every passenger is accepted to earn miles from only credit cards and redeem those miles only for an award ticket. If passengers earn more miles from other sources, it just helps them fly to their desired destination(s) with reduced credit card expenditure.

This section is comprised of four specific subsections. In Section 4.1, the formulation of research questions is discussed that addresses gaps in the academic literature. In Section 4.2, FFMS analysis via simulation is discussed in detail. The outcome of Section 4.2 is to determine which airline co-branded credit cards offer their customers the possibility to fly with an award ticket using the minimum credit card expenditure. In Section 4.3, the effects of airline frequent flyer programs on operational revenues are studied using a proposed SEM model for the period between the first quarter of 2016 and the last quarter of 2019. Periods beyond 2020 cannot be included in this research because of the impact of the COVID-19 virus on the airline operations. Section 4.4 gives information about merging the Sabre© data and airline award mileage charts via Adobe Indesign© software. Finally, Section 4.5 provides information about the hypotheses used in this study that will be subsequently tested.

4.1 Formulation of Research Questions

Regarding various literature reviews given in Chapter 2, for some aspects regarding frequent flyer programs and their relation with airline co-branded credit cards, no conclusive research has been derived at this point. Here, the most important questions that remain unanswered regarding frequent flyer programs are overviewed.

4.1.1 Research Questions

According to the lack of literature regarding airline co-branded credit cards discussed in this section, the research questions can be formulated as follows:

Research Question 1 : Is the overall value (equivalent cash value) to consumers of bonus miles offered by different airline co-branded credit card programs significantly different for each carrier?

Research Question 2 : What is the best airline co-branded credit card overall in terms of requiring the minimum credit card expenditure to fly with an award ticket?

As each of the selected airline programs has different mileage earning and redemption strategies, regarding research questions one and two, this dissertation offers a way to understand which airlines are successful in keeping their competitive advantage in their airline frequent flyer program via FFMS analysis, which is discussed in Section 4.2.

Research Question 3 : How does airline demand via market share and total number of passengers carried on flight routes impact the FFMS ratio?

Regarding the third research question, this dissertation offers an exploratory SEM model to investigate the relationships. The detailed description of the SEM model is given in Section 4.3 of this study.

By empirically addressing these research questions, this dissertation can enlighten consumers and top airline management.

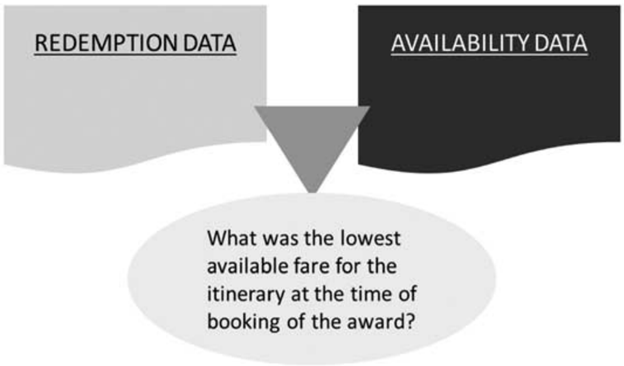
4.2 FFMS Analysis

This research is ultimately grounded in consumerism—the protection and promotion of consumer interests. Associated theories of consumer advocacy have recognized that the balance of power and information has typically belonged to sellers. Hence, over the years, consumer advocates have called for more buyer rights, including the right to be well informed about products and to protect against questionable marketing practices (Armstrong & Kotler, 2015). Considering that customers do not readily know what a mile is truly worth regarding dynamic redemption practices, customers are arguably ill informed when deciding on a co-branded credit card. Synergizing behavioral economic considerations illustrating that customers seldomly make rational decisions regarding frequent flyer programs, the FFMS can help customers make more informed choices at the individual level.

Given the important co-branded credit card contribution to airlines, frequent flyer program management tends to go through an extensive process of selecting the right card and bank to partner with. In some cases, the programs will seek outside counsel provided by specialized companies. For some airline loyalty programs, a credit card issuing bank can contribute their knowledge about marketing the card, in addition to marketing the awards. As this process has become more complicated, passengers have started to receive tremendous amounts of marketing materials from different airlines and banks, all claiming to provide the best award travel program.

Today, the only publicly available resources for comparing different credit card programs are Internet blogs, such as The Points Guy (Blancaflor, 2020) website. The airlines or the banks do not offer a comparison tool or data for their competitors programs. Although this site provides general knowledge about how many miles a passenger can earn from their card expenditures and provides information about the perks offered by different cards, it lacks information regarding redeeming credit card rewards and the currency of co-branded cards. According to some studies in the literature review section, it is clear that Airline A's frequent flyer miles cannot be equal to Airline B's frequent flyer miles. Therefore, the information provided by Internet sites like The Points Guy is insufficient for passengers to decide on the right credit card that will enable them to reach their desired travel destination with the lowest credit card expenditure.

Previous academic research related to selecting the most suitable credit card offer from airline loyalty programs has focused on determining the monetary value of an airline frequent flyer mile. Winship (2011) estimated that, for U.S. programs, the average monetary value of a frequent flyer mile is about 1.2 cents, but noted that there is a possible range of from less than 1 cent to more than 10 cents per mile redeemed. According to Winship's (2011) study, value per mile can be derived by projecting the value of the redemption items broken down to a per mile value. For example, if an award ticket for a round-trip ticket between Sydney and Hong Kong on Qantas Airlines requires 137,900 frequent flyer miles, which has the equivalent lowest base fare of AUD 770, the value achieved per mile redeemed is 770 ÷ 137,900 = AUD 0.0055. This approach yields a significant variance in the value per mile, depending on the basket of redemption items included in the comparison. According to Unsal (2018), redeeming frequent flyer miles for business-class cabins tends to yield a much higher per mile value. Winship (2011) corroborated this phenomenon by calculating award travel from Tokyo Haneda to Frankfurt via the first-class cabin on Lufthansa Airlines, which had a retail price of JPY 1,970,270 (Japanese Yen). Lufthansa required a redemption of 105,000 miles for a one-way ticket on this route. So, the monetary value per mile on this route exceeded 16 cents. A sample calculation model described by Basum-Allick, Ozdaryal, and Madamba-Brown (2013) is given in Figure 4.1.



One Way Lowest Mileage

25,000 miles

One Way Lowest Fare

200,00 USD

Worth of an Airline mile =200/25,000 = 0.8 Cents

Figure 4.1. Calculation of value of an airline mile.
Redesigned from the study of Basumallick, D., Ozdaryal, B., & Madamba-Brown, C. (2013). Perceived value of a mile. *Journal of Revenue and Pricing Management*, 12(1), 8-15.

Regarding award mile redemption, Sorensen (2013) noted that there seems to be an inverse relationship between award value and ease of redemption. Promotional award seats with reduced miles in first and business class provide the best value but were observed to be the most challenging seats to find. Car rentals, hotels, and merchandise awards are readily available but tend to represent a lower value of about 1 cent per mile redeemed. However, expressing the richness of a program in a monetary value per mile is one approach, and a few different approaches exist to calculate the generosity of an airline frequent flyer program.

A commonly used approach for comparing different airline loyalty programs is the earn–burn metric. It expresses the number of trips a member needs to make to accrue enough miles to redeem on the same city pair, ceteris paribus. The simplicity of the model makes it attractive, and it can be easily used to quickly compare programs. However, it may oversimplify matters, as it does not consider other factors, such as availability, taxes, and surcharges. The most important weakness of this calculation method is that it disregards frequent flyer miles earned from credit cards.

Another more complex comparison technique defines generosity as the payback percentage of the eligible points spent on the airline. For some programs, such as Norwegian Rewards (Norwegian, 2020), the percentage is fixed and, therefore, very transparent. Members earn 2% CashPoints on low-fare tickets and 20% CashPoints on Flex tickets. The currency earned is as good as cash and can be used for any future purchase on the airline. The flaw of this approach is that it disregards the effects of credit cards. Furthermore, passengers are directed to expensive tickets to receive more points. Thus, the rewards do not come free. This effect raises the question of whether the expenditure to get a free ticket is more or less than the actual value of the award travel ticket.

Another comparison tool, the economic payback analysis, would be even more challenging for a traditional mileage-based or even revenue-based program because it is necessary to consider the true economic value of the redemption item. Regarding merchandise, this is fairly straightforward. For example, with an iPhone where its retail value can be easily assessed, the calculation is very easy. Conversely, assigning a value to a redemption award that is subject to availability restrictions and possibly subject to significant taxes and surcharges is a more complicated matter. Suzuki (2003) noted that assessing which airline loyalty program provides the best benefits is an arduous task. Therefore, because the answer varies among individual travelers, the FFMS analysis was introduced by Unsal (2018) as a developing model that provides a calculation tool that may offer a means of determining which airline program requires the minimum credit card expenditure to fly free within the airline or its network partners.

According to Unsal (2018), the author derived a new quantitative tool called Frequent Flyer Money Saver (FFMS) analysis to examine the change in the FFMS ratio in Turkish Airlines flights, which is explained by difficulty level of booking a free ticket, desired traveling distance between two cities, available seats on flights, and weekly flight frequency. During the study, all the quantitative data out of credit card expenditure were obtained directly from the Turkish Airlines website reservation subpart. The credit card expenditure rates required to get an award airline ticket were obtained from the Garanti Bank (Official Bank Partner of Turkish Airlines) website. The ticket prices were obtained on October 15, 2018 for flights between 13 and 19 November 2018, for the third week of November for a return ticket. The route frequency indicates the number of total flights within this particular week between the two selected cities. The number of observations for business class flights was less than for economy flights because a certain type of route was served by planes with single class cabin outlines.

Unsal (2018) suggested that, except for difficulty level of booking award tickets, all variables have a significant relationship with the FFMS ratio for Economy Class flights at a significance of 1%. The reason behind why we cannot obtain a significant relationship for the difficulty level of booking in Economy Class is that the passengers are very sensitive to ticket prices. They are open to new flight proposals with less price and mileage value. So, if they encounter difficulty in finding a seat in a particular route, they may change their travel destinations. Therefore, the demand for Economy Class flights is elastic.

According to the same study conclusion, for Business Class flights, the difficulty level of booking and the distance between two cities have a significant relationship at 1% with the FFMS ratio. This is because as the flight route gets farther, the number of required miles to buy an award ticket is 3 to 4 times higher than the shorter routes. For the difficulty level of booking, the ticket prices of certain routes, such as Hong Kong, New York, and Singapore flights in Business Class, are extremely expensive, and it is complex to find available seats on the aircraft. For example, Turkey to Singapore award tickets were generally sold out approximately eleven months before departure. So, it is reasonable that we received a positive coefficient from the model. Therefore, it can be concluded that the demand is inelastic for Business Class flights.

In the Unsal (2018) case study, the author concluded that the FFMS methodology tool helps to understand the factors affecting the award mile seat demand in Turkish Airlines flights. The FFMS ratio is highly correlated with the demand for a particular flight because the airline is using a dynamic pricing algorithm. The findings of this Unsal (2018) research were presented at the AGIFORS 2018 Strategic Planning Study Group meeting. Regarding the comments obtained from various airline experts who attended the meeting, this study has several problems. The first problem is that the dataset is generated manually from the airline website for just one week, and the difficulty level of booking data is limited to personal observation of a few customer sales agents working in a single operation unit. Therefore, even if the FFMS ratio is a new approach, the linear regression used in this study was not a globally valid methodology usable for every airline.

After the first research related to FFMS analysis, Unsal (2019) conducted a new research with an updated model to examine changes in the FFMS ratio for Turkish Airlines and Aegean Airlines flights that are explained by the desired traveling distance between two cities, the number of available seats for award tickets, and weekly flight frequency. The FFMS analysis tool helps in understanding the factors affecting award mile seat demand on Turkish Airlines and Aegean Airlines flights. The calculations revealed that the FFMS ratio is highly correlated with demand for a particular flight because the airlines use a dynamic pricing algorithm.

According to Unsal's (2019) research, to increase passenger satisfaction from loyalty programs, this research was presented at the World Conference on Transport Research in Mumbai (2019) and the Globe Conference on International Business and Economics in Istanbul (2019). According to comments obtained from these two conferences, seasonality is still another problem in this study because the observations were made for one week for each airline. Furthermore, as the availability of seats reserved for award seat redemptions is not published for every airline, this study cannot be replicated for every airline.

Regarding the FFMS methodology, it has been suggested by Gudmundsson (2018) and Oum (2019), that the idea of calculating the FFMS ratio is unique in the literature related to frequent flyer miles, but that a different approach out of linear regression is needed to investigate deeply the factors affecting the FFMS ratio, especially where the data are scientifically available for the variables. Regarding these comments, in this dissertation, the FFMS ratio is analyzed via simulation, and the factors affecting the FFMS ratio are analyzed using SEM modeling.

The mathematical ratio proposed by Unsal (2018) for the FFMS ratio calculation is as follows:

$$(FFMS\ Ratio\ )_i = \frac{(Net\ Ticket\ Price)_i}{(Credit\ Card\ Expenditure)_i} \qquad (1)$$

where:

The variables are:

Credit card expenditure = the average credit card expenditure required to get the selected ticket for free.

Net ticket price = the net quarterly average ticket price for the entire travel classes for each selected route (excluding taxes).

Index i = Represents each of the marketed travel routes by selected carriers for each quarterly time period.

In this dissertation, the same FFMS ratio was used. In this research, the Credit Card Expenditure was calculated from individual airline frequent flyer program specifications that were published on their frequent flyer websites and airline co-branded credit card issuer bank web pages. Four of five airlines in this study have published their award mileage charts on their official web pages. However, regarding Delta Air Lines, as the airline discontinued publishing its award mileage chart officially, the award mileage chart can be generated for each specific route region based on the Sky-Team Global airline alliance global region classifications. As no airline mileage data was publicly available for our selected airlines, the average mileage requirement will be used to calculate the required credit card expenditure for each selected route. The net ticket price for each selected route is obtained from the Sabre© Marketing Intelligence database. The net average quarterly ticket price data represents the average ticket price for each selected route. Therefore, the calculated FFMS ratio will represent the average FFMS ratio based on the average ticket price and average credit card expenditure requirement.

An important contribution of this research regarding previous FFMS calculations is that simulation software is required to compare different credit cards. As the personal choice of travel varies significantly among passengers, the selected airlines in this study can offer thousands of route combinations, which include multiple domestic and international transfers both within the airline network and airline code-share alliance network partners. Therefore, it is not possible to analyze a group of passengers' perspectives and generalize these passenger behaviors to the entire aviation system inside the U.S. During this study, @RISK software offered by Palisade Company was used. @RISK is an add-in to Microsoft Excel application that enables risk analysis using Monte Carlo simulation. @RISK shows virtually all possible outcomes for any situation and provides information on how likely they are to occur. This means that researchers can judge which risks to take and which ones to avoid.

The main contribution of implementing @RISK software within this dissertation is that it shows the possibility of earning higher miles from each different type of credit card included in the study.

The outcome of the simulation enlightens us about the possibility of getting a higher average FFMS ratio for each selected airline co-branded credit card. During the calculations, the focus was to determine what percentage of the selected co-branded credit card users had a higher FFMS ratio than the lower rank credit card users in the FFMS ranking order.

Regarding the simulation, unlike the previous studies, the FFMS ratio simulation was based on Sabre Marketing Intelligence data for all domestic and international flight data between the first quarter of 2016 and the last quarter of 2019 for each selected airline. During the simulation, 100,000 iterations are made to replicate 100,000 passenger movements within the selected airline marketing network.

The selected airline network includes all of the marketed flights of our selected airline, including all code-share operations and transfer possibilities. According to American Airlines (2020), this airline carries more than a million passengers daily. Therefore, 100,000 passengers is acceptable as a good sampling size with around 1/10 ratio. Furthermore, a more substantial number of iterations enabled us to receive more precise results from the study.

After obtaining the simulation results, to compare different FFMS ratio earning possibilities of different selected credit cards, a new comparison methodology called Expected Marginal FFMS Returns (EMFR) was used in Section 6.1.5 of this research. The EMFR methodology can be calculated by multiplying the chance of obtaining a higher FFMS ratio for each selected airline and the difference in the maximum FFMS ratio for each carrier. The mathematical formulation of the EMFR method is given below:

Correlation Coefficient = Chance of Obtaining a Higher FFMS Ratio in percentage × Difference between Maximum FFMS Ratios in percentage

Based on this formulation, both the variables can be obtained by individual simulation results obtained from RISK software. Regarding the correlation matrix, if the observed coefficient exceeds 1, passengers can earn higher FFMS returns. So, they will be advised to change their credit cards. If the observed coefficient is below 1, the passenger will have a lower FFMS return. The coefficient of 1 indicates that the passenger is using the same credit card.

4.3 Structural Equation Modeling (SEM)

In addition to the simulation, a structural equation modeling methodology was used to research the effect of different parameters on the FFMS ratio. Structural equation modeling is a multivariate statistical analysis method used to analyze structural relationships. This technique is a mixture of element evaluation and more than one regression analysis. As such, it is used to analyze the structural relationship between measured variables and latent constructs. This method is desirable because it estimates multiple and interrelated dependencies in a single analysis. In this analysis, two types of variables were used: endogenous and exogenous.

The SEM model used in this study was proposed as an exploratory model because no previous analytical SEM models have been used for airline loyalty programs in the literature. Furthermore, based on the literature review section, the unique rewarding structure of airline loyalty programs enables passengers to obtain a very high monetary value of rewards. For example, if a person demands a stay in a average Hilton hotel property for two nights, they need to spend 100,000 points for a room worth approximately 400$. However, according to Winship (2011) study, if this customer redeems his points for an air travel between Tokyo Haneda to Frankfurt on First Class cabin, he will save $18,423.22 worth of money. The monetary difference between these rewards are extremely high. As the monetary award value of award seats are significantly higher than the award value of other marketing sectors, existing equation models for different types of loyalty programs cannot be applied to aviation-related loyalty programs. Consequently, this dissertation is the first academic research to use an SEM model in a quantitative study of airline loyalty programs. Since the results of the SEM model cannot be verified or benchmarked with other scientific studies, it is considered exploratory and is represented in Figure 4.2 as follows:

4.3.1 Defining Route Characteristics

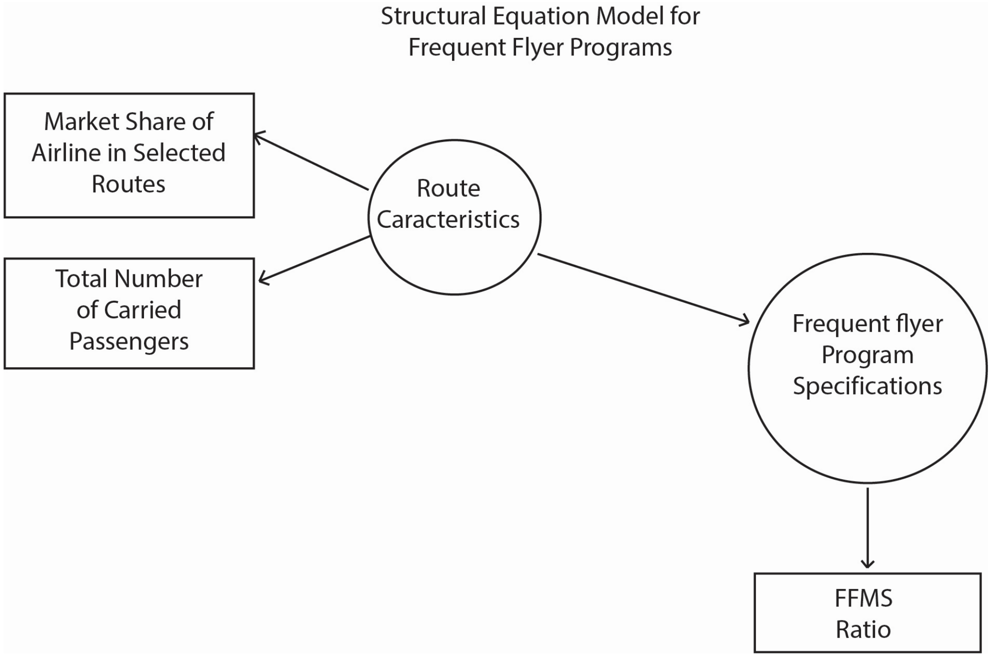


Figure 4.2. Structural Equation Model for Frequent Flyer Programs

Detailed information regarding the formation of latent variables are given in the section 4.3.1 to 4.3.3 as follows;

In this study, the latent variable of route characteristics reflects the infrastructure capacity of a selected airline on a particular route. This capacity includes aircraft variations, flight frequency, and the overall capability of an airline to amass customers on routes. So, regarding thousands of route combinations within this study, it is not possible to measure all these effects individually for each of the marketed routes of the selected airlines. Therefore, the latent variable of route characteristics was defined to represent all these specifications within a particular flight route. The observed outcome of this latent variable is accepted as the total number of passengers carried and the market share of airlines.

4.3.1.1 Total Number of Carried Passengers

Regarding the inclusion of the total number of passengers carried in the selected periods, Vasigh et al. (2016) stated that demand may be defined as the ability and willingness to buy specific quantities of goods or services at alternative prices within a given period. Understanding demand theory and the demand function is one of the more critical aspects of the aviation industry because the characteristics of demand dictate the patterns and characteristics of sales. The law of demand states that as price increases, the quantity demanded decreases. Alternatively, the amount requested has a negative relationship with the price. If airlines continuously raise ticket prices, at some point, passengers will consider it too expensive to fly and will not make the trip. This decision to not fly is the law of demand in practice, that is, at some price, the quantity demanded by the individual will decrease. Therefore, as the number of total passengers varies due to the law of demand, the inclusion of this parameter will be beneficial in understanding the effect of passenger demand on frequent flyer programs. In this research, these data represent the total number of passengers carried for each quarter for a specific flight route for each selected airline. Therefore, regarding the period between the first quarter of 2016 and the last quarter of 2019, the dataset includes 16 different quarterly passenger numbers for each flight route marketed by our selected airlines.

4.3.1.2 Market Share of the Airline

According to Babic et al. (2014), the value of the market share of a particular airline should be valuable information for the airline top administration, who, in every moment, have to be conscious of the airline's role toward its competitors on individual flight routes and in the general market. By gaining greater portions of the market, airlines have a chance to maximize their revenue. An airline can also adopt numerous techniques to fulfill this goal. An airline can choose to offer more frequency on certain routes, or may provide more seats on certain routes using bigger airplanes. The method used will depend on the strategy of the airline, as it seeks profitable growth. However, the market share will also depend on the airline's competitors and their potential to perform well on the routes involved. Generally, market share can be expressed in several distinctive approaches depending on the considered variables.

The market share of a selected airline cannot be confused with the airport's marketing share of an airline. However, in this study, the market share of a particular airline was calculated by analyzing how many passengers were carried by a particular airline in a specific flight origin and destination. Therefore, airport dominance was not an important factor in this SEM model. Regarding The Points Guy (2020), passengers are encouraged to enroll in the dominant airline frequent flyer program, which is close to their hometown. However, practically speaking, if passengers reside in a larger hub, these larger hubs are still connected to other hubs via connection transfers within the U.S., especially for the big three airlines (Delta, American, and United Airlines). Furthermore, these airlines do not ask additional mileage for connecting transfers within the U.S. for award tickets, excluding the taxes. So, a passenger can enroll in United Airlines frequent flyer program even if they are residing in Atlanta, the hometown of Delta. It is expected that passengers can select to fly one additional connection flight if they stay near another airline base hub region to reach their destination, especially for long-haul flights.

During this study, Sabre© data include all departure points and landing points of each desired travel route combination. Regarding these data, the route market share is calculated by how many passengers are ticketed by the selected airline divided by the total number of ticketed passengers within a particular airline route. The calculations were made for each selected route for every observed quarterly data. The reason for selecting ticketed passengers instead of flight passengers is that the frequent flyer programs are based on marketing the airline products and airline code-share partner products based on award mileage charts. Therefore, some of our selected routes included multiple airlines ticketed by our selected airline. As such, the inclusion of market share based on ticketed passengers for a specific route is essential in this study.

4.3.2 Frequent Flyer Program Specifications

In this research, the latent variable construct of frequent flyer program specifications was selected to represent the factors that define the characteristics of frequent flyer programs. The concept of frequent flyer specifications includes the factors affecting the measures taken by program management to regulate the entire program. The most important factor in this section is designing award mileage charts based on specific flight sectors defined by each airline. The availability of award seats, the frequent flyer program mile redemption rules and the global airline alliance practices based on ticketing for multi-airline-operated air tickets via frequent flyer miles are all important aspects that will fluctuate the FFMS ratio. During the SEM calculation, the only parameter of the frequent flyer program specification latent variable is the FFMS ratio. The FFMS ratio comprised the observed variables of the net ticket price of the airline and the required credit card expenditure. These two variables are described independently in this section of the research as follows:

4.3.2.1 Net Ticket Price of the Airline

The net ticket price of the selected airline variable refers to the average net ticket price excluding the taxes and any other surcharges for a particular airline for each selected route for different quarterly periods. Regarding Vasigh et al. (2016), the selected airlines in this study implement a ticketing strategy called dynamic pricing.

Dynamic pricing, also referred to as surge pricing, demand pricing, or time-based pricing, is a pricing method in which companies change prices, often based on market factors. Algorithms consider competitor pricing, supply, and demand conditions and other external elements in the marketplace. Dynamic pricing is a common practice in several industries, such as hospitality, tourism, entertainment, retail, electricity, and public transport. Each enterprise takes a slightly different strategy from dynamic pricing based on its individual strategy. Airlines often change prices depending on the day of the week, time of day, and number of days prior to the flight. Furthermore, the ticket price also directly affects passenger demand, based on the law of demand. So, for each different quarterly period, significant fluctuations can easily be observed for the ticket prices. Therefore, it is an essential variable to include in this study. In this study the net ticket price data obtained for each selected airline was used. Based on the dynamic pricing, the ticket prices of the selected routes changes based on the travel demand.

4.3.2.2 Required Credit Card Expenditure

The required credit card expenditure variable depends on award mileage classifications and award mile redemption requirements for each particular airline. Award charts show how many frequent flyer miles a passenger needs to accumulate to take their desired trip. These awards can fluctuate appreciably on specific routes. The required credit card expenditure variable is calculated by dividing the average mileage requirement for each selected airline and route to generate an award ticket by the air mile amount offered by the airline co-branded credit card. For example, a flight from the U.S. to the Caribbean may require 17,500 United Airlines miles each way. The United Mileage Plus credit card gives a minimum of 1.5 miles per USD expenditure. So, a passenger could spend $11,667.60 with their credit card to fly free in this flight route.

Based on the example stated above, each of the selected airline routes has different mileage requirements for the selected airline. Generally, the mileage requirement goes parallel to the airline pricing strategy. Highly priced tickets require a higher number of miles to generate an award ticket. Furthermore, some airlines use static award charts that do not fluctuate with the route demand. However, some of the airlines are using a dynamic award redemption system. So, the award mile requirements of the selected airlines significantly differ from each other. Therefore, the inclusion of this parameter in the FFMS ratio is crucial for this study.

4.4 Analytic Approach

In this study, the Sabre data, including the total number of carried passengers, airline market share, net ticket price contain thousands of route combinations. The Sabre dataset is classified by point of origin through the point of destination. The award mileage charts include data regarding the geographical distribution of all travel routes defined by each specific airline frequent flyer program and the required number of miles needed to fly within these routes with an award ticket. To run an FFMS analysis and SEM modeling, these two datasets need to be matched for each specific route combinations. For example, Sabre data flights, which originated from the U.S. and were finalized in Europe, must be matched with specific European mileage requirement data.

The SEM analysis was conducted using Smart PLS software to validate the measurement parameters and to test the path model. PLS-SEM is an appropriate tool when the nature of the research is exploratory; there are a limited number of indicator variables, and the research goal is to maximize the explained variance of the endogenous constructs (Hair et al., 2016). Moreover, PLS-SEM is a non-parametric approach that makes no distributional assumptions. The combination of these factors make PLS-SEM the more appropriate approach than maximum likelihood estimation for this research.

To match both datasets, a unique script tool is used within Adobe InDesign software. Adobe InDesign is a desktop publishing software application for creating newspapers, journals, and books. Projects created using InDesign can be shared in both digital and print formats. InDesign is an industry standard for publishing design and is used by graphics and marketing professionals and by other types of specialists working on different types of projects.

Therefore, matching these datasets can quickly be done for thousands of flight variables within the InDesign layout via a particular script. Next, is a discussion of the hypotheses developed to address the research questions.

4.5 Hypotheses

Regarding the research questions mentioned in Section 4.1 and the proposed models for this research, the hypotheses can be formulated as follows:

H1: There is a significant difference in the FFMS ratio for each airline in this study.

H2: The possibility of obtaining a higher FFMS ratio is significantly greater for the big three airlines.

In a previous FFMS study, Unsal (2019) revealed that the FFMS ratio differs at least 30% between Aegean and Turkish Airlines. So, the value of mile as earned from Turkish Airlines co-branded credit card significantly exceeded that of Aegean Airline miles. Hence, it is likely that there will be statistically significant differences across the five airlines tested in this study. Considering the big three airlines, including Delta, United, and American Airlines, operating a significant number of intercontinental and international routes with multiclass cabin features, it is expected that the possibility of obtaining higher FFMS ratios for these airlines will significantly exceed that of Alaska and Hawaiian Airlines.

These first two hypotheses are tested using FFMS analysis, as outlined in Section 4.2 of this dissertation. The third hypothesis discussed below is tested using the path model and PLS–SEM, as outlined in Section 4.3 of this dissertation.

H3: The route specifications (the number of carried passengers and the market share) are negatively associated with frequent flyer program specifications (FFMS ratio) for each of the selected airlines.

The FFMS ratio consist of two variables both price and the required credit card expenditure. Regarding the ticket price, the law of demand in aviation states that the quantity purchased varies inversely with price. Alternatively, the higher the price, the lower the seats demanded. During the research, it is expected that the ticket prices will be higher in markets where the selected airlines have a lower market share. The ticket prices for low-demanded international routes are higher than for high-demanded domestic destination tickets. Regarding the required credit card expenditure, the required amount of credit card expenditure is also higher for higher priced travel destinations. In this study we are using the ratio of these variables. Regarding the volatility of these variables for each of the selected travel routes, no conclusive inference can be made for correlation between route specifications and the FFMS ratio before the calculations. But it is expected that as the number of passengers and the demand increases, the FFMS ratio will go downward.

To verify the findings of the third hypothesis, another verification study was conducted on a selected large international airline hub airport in which all the big three carriers can offer numerous domestic and international connection opportunities for their passengers. As the findings of this research cannot be benchmarked with previous research, verification of these findings is crucial to refute or accept the third hypothesis.

This hypothesis is tested and reported in subsequent sections of this dissertation.

CHAPTER V
Collection of Data

In this research, data related to carried passenger numbers, airline market share and route base fare variables were obtained from the Sabre Aviation Database. Data related to required credit card expenditure to obtain an award ticket for selected route was obtained from selected the airlines' websites. All the datasets included total quarterly data for all marketed flight segments. The dataset covered the period between the 2016 first quarter and the 2019 last quarter (a total of 16 quarters).

The selected flight segments in this dissertation include all domestic and international flights marketed by the selected specific airlines. The reason behind selecting marketing carrier statistics instead of operating carrier statistics is because airlines tend to sell award tickets in which they include code-share partnerships and alliance partner flights. So, a frequent flyer customer can use their award miles within multiple operators, which can be sold via their loyal frequent flyer program owner airline. Therefore, it is essential to use marketing data instead of operational statistics. In the following subsections, information regarding each airline data is given separately in detail.

5.1 Delta Air Lines Data

Delta Air Lines, Inc., typically referred to as Delta, is one of the major airlines of the United States and is a full-service carrier. It is headquartered in Atlanta, Georgia. Delta, along with its subsidiary, operates under the roof of the Sky Team global airline alliance. According to Delta (2019), Delta and its worldwide alliance partners operate more than 15,000 flights per day. The airline has nine hub locations within the U.S., which are given below in detail.

•Atlanta—Delta's hub for the Southeast and its primary gateway to Latin America and the Caribbean. In addition to its corporate headquarters, Delta operates its major hub in Atlanta along with Delta Technical Services.

•Boston—Delta's secondary transatlantic hub. The current Terminal A was reserved for Delta's sole use.

•Detroit—Detroit serves as one of the Delta's two Midwest hubs and is Delta's second-largest overall. It is the principal Asian gateway for the Eastern United States, and it additionally provides service to many locations in the Americas and Europe.

•Los Angeles—Delta's Secondary West Coast hub. Delta gives carriers the opportunity to select cities in Latin America, Asia, Australia, and Europe, alongside fundamental domestic cities and West Coast regional destinations.

•Minneapolis–Saint Paul—Minneapolis–Saint Paul serves as one of the Delta's two Midwest hubs. It is the fundamental Canadian gateway for the airline while also including many American metropolitan destinations, a variety of regional locations in the upper Midwest, along with select destinations in Europe and Asia.

•New York–JFK—Delta's principal transatlantic hub. This hub also provides service on many transcontinental "prestige routes" to west coast locations, such as Los Angeles and San Francisco.

•New York–La Guardia—Delta's 2nd New York hub. Delta's carrier at La Guardia covers numerous East Coast U.S. cities and some regional locations in the U.S. and Canada.

•Salt Lake City—Salt Lake City serves as the fourth-largest hub for the airline. From Salt Lake City, Delta covers most fundamental U.S. destinations and a quantity of regional destinations in the U.S., with an emphasis on the Rocky Mountain region, along with select destinations in Canada, Mexico, Europe and Hawaii.

•Seattle/Tacoma—Delta's foremost West Coast hub. The hub serves as an international gateway to Asia for the Western United States. Delta service also comprises many essential U.S. locations, along with regional locations in the Pacific Northwest.

Regarding the Sabre Intelligence Database (2020), Delta Air Lines marketed 294 different route combinations within the domestic US and 413 different route combinations in international routes. Regarding this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 3,747 and for international routes was 2,503. Therefore, the total number of observations for Delta Air Lines was 6,250. In Figure 5.1, the total passenger distribution of Delta Air Lines was given for domestic airline routes for a total of 16 quarters, and in Figure 5.2, the passenger distribution of Delta Air Lines was given for international airline routes for 16 quarters period.

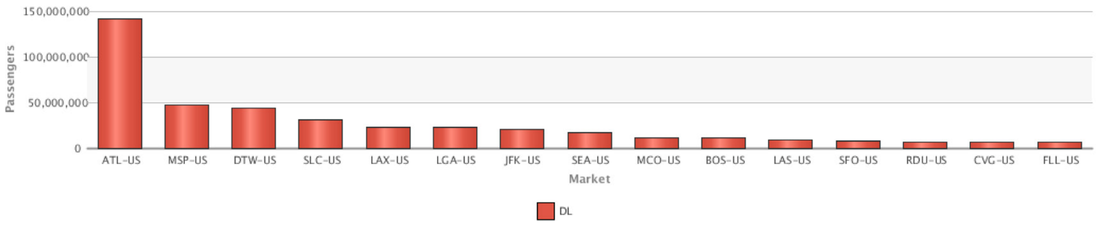


Figure 5.1 Delta Air Lines Domestic Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

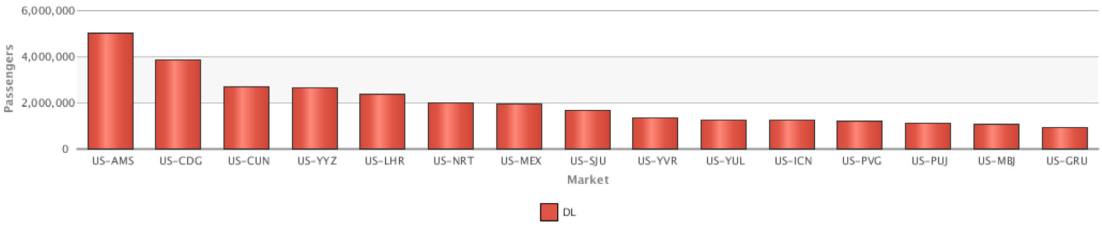


Figure 5.2 Delta Air Lines International Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on Delta Air Lines Data obtained from the Sabre Marketing Intelligence database are given in Table 5.1 as follows:

Table 5.1

Delta Air Lines Descriptive Statistics

	Number of Observations	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	6,250	727.63	632.72	2.25	6,413.81	655.66
Passengers	6,250	2,665,511.69	29,990.17	1	46,328,056	9,680,832.12
Credit Card Expenditure USD	6,250	35,302.42	35,000.00	17,000.00	60,000.00	12,689.26
Airline Market Share %	6,250	13.06	11.25	0	55.46	14.89

5.2 American Airlines Data

American Airlines, Inc., is a major American airline headquartered in Fort Worth, Texas, within the Dallas–Fort Worth metroplex. Regarding CAPA (2020), American Airlines is the world's largest airline when measured by fleet size, scheduled passengers carried, and revenue passenger mile. American, together with its regional partners, operates an extensive international and domestic network within the scope of the One World global airline alliance. Regional service within the US is operated by independent and subsidiary carriers under the brand name American Eagle. The information regarding 10 different airline hubs is as follows:

•Charlotte—Is American's hub for the Southeast and secondary hub to the Caribbean. It serves as one of American's larger gateways to Europe. American Airlines (2020) has about 91% of the market share at CLT.

•Chicago–O'Hare—American's hub for the Midwest. American has about 35% of the market share at O'Hare, making it the airport's second-largest airline after United.

•Dallas/Fort Worth—American's largest hub for the South. It serves as American's most important gateway to Mexico and secondary gateway to Latin America.

•Los Angeles—American's hub for the West Coast and its transpacific gateway. American (2020) has about 19% of the market share at LAX, making it the largest operator at the airport.

•Miami—American's predominant Latin American hub. American (2020) has about 68% of the market share at Miami International, making it the largest airline at the airport.

•New York–JFK—American's secondary transatlantic hub. JFK also serves as a predominant connecting partner for other One World global alliance carriers.

•New York–La Guardia—American's 2nd New York hub. The airport also serves as a base for the American Airlines Shuttle.

•Philadelphia—Inherited from the merger with US Airways, Philadelphia is American's principal transatlantic hub. American (2020) has about 70% of the market share at PHL, making it the airport's largest airline.

•Phoenix–Sky Harbor—Inherited from the merger with US Airways, Phoenix is American's western hub.

•Washington–National—American's hub for the capital of the United States. The airport additionally serves as a base for the American Airlines Shuttle.

Regarding the Sabre Intelligence Database (2020), American Airlines marketed 307 different route combinations within the domestic US and 248 different route combinations in International routes. Regarding this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 4,114, and for international routes, was 2,384. Therefore, the total number of observations for American Airlines was 6,498. In Figure 5.3, the total passenger distribution of American Airlines was given for domestic airline routes for a total of 16 quarters, and in Figure 5.4, the passenger distribution of American Airlines was given for international airline routes for 16 quarters period.

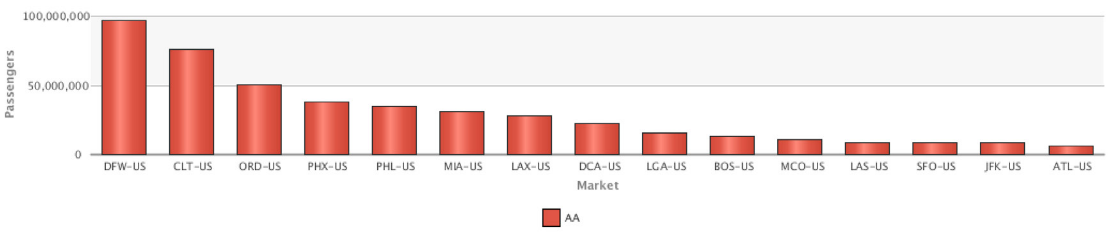


Figure 5.3 American Airlines Domestic Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

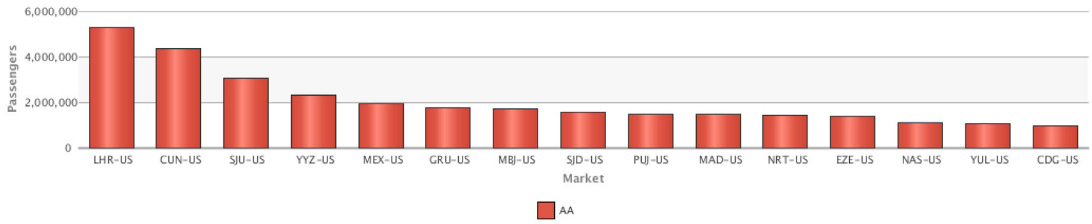


Figure 5.4 American Airlines International Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on American Airlines Data obtained from the Sabre Marketing Intelligence database are given in Table 5.2 as follows:

Table 5.2

American Airlines Descriptive Statistics

	Number of Observations	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	6,498	391.02	368.39	104.28	2,026.98	248.76
Credit Card Expenditure USD	6,498	29,527.36	30,000.00	12,500.00	40,000.00	10,672.42
Passengers	6,498	3,677,396.39	240,816.87	2	46,454,780	11,436,979.50
Airline Market Share %	6,498	10.96	7.72	0	31.87	10.08

5.3 United Airlines Data

United Airlines, Inc., is a major American airline headquartered in Chicago, Illinois. United operates a large route network spanning cities, large and small, throughout the United States and all six continents. Regarding fleet size and number of routes, it is the third largest airline in the world (United, 2020). United Airlines is a founding member of the Star Alliance, the world's largest airline alliance with a total of 28 member airlines (Star Alliance, 2020). Regional US service is operated via impartial carriers under the name United Express. United Airlines operates with eight different hub locations as follows:

•Chicago–O'Hare—United's largest hub where headquarters is located and its hub for the Midwest. Regarding Sabre (2020), United flies approximately 38 million passengers from this location.

•Denver—United's fourth largest hub and its hub for the Rocky Mountain vicinity of the United States.

•Guam—Inherited through the merger with Continental, Guam serves as United's hub for flight routes in the Pacific region. According to Sabre (2020), about 313,000 passengers flew through Guam annually.

•Houston–Intercontinental—United's 2nd largest hub and its hub for the Southern United States. It is the fundamental gateway to Latin America.

•Los Angeles—United's secondary hub for the West Coast and gateway to Asia and Australia.

•Newark—United's 3rd biggest hub and its important hub for the New York City market and the Eastern Coast of the United States. It is United's predominant gateway to Europe, together with different specific flights to Latin America and Asia.

•San Francisco—United's fifth largest hub and its essential hub for the West Coast and gateway to Asia and Australia.

•Washington–Dulles—United's secondary hub for the East Coast and gateway to Europe.

Regarding the Sabre Intelligence Database (2020), United Airlines marketed 328 different route combinations within the domestic US and 246 different route combinations in International routes. Regarding this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 3,983, and for international routes, was 2,391. Therefore, the total number of observations for United Airlines was 6,374. In Figure 5.5, the total passenger distribution of United Airlines was given for domestic airline routes for a total of 16 quarters, and in Figure 5.6, the passenger distribution of United Airlines was given for international airline routes for 16 quarters period.

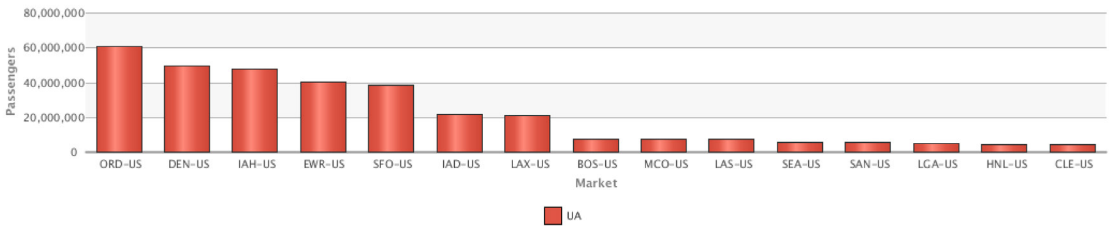


Figure 5.5 United Airlines Domestic Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

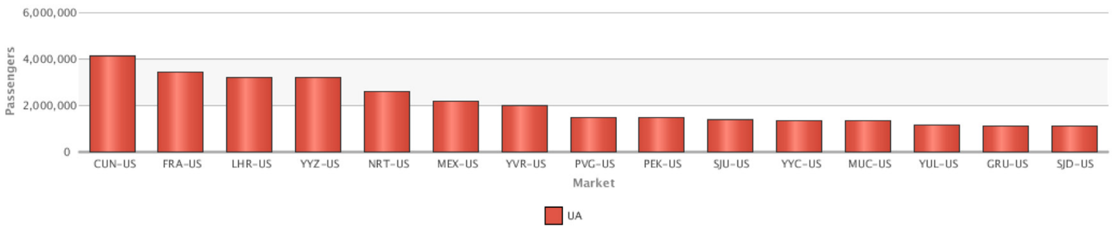


Figure 5.6 United Airlines International Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on United Airlines data obtained from the Sabre Marketing Intelligence database are given in Table 5.3 as follows:

Table 5.3

United Airlines Descriptive Statistics

	Number of Observations Used	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	6,374	740.11	678.34	20.26	8,440.90	706.74
Credit Card Expenditure USD	6,374	21,400.27	26,667.00	8,333.00	28,333.00	7,308.57
Passengers	6,374	2,211,184.18	66,746.83	1	33,979,438.00	7,424,244.65
Airline Share %	6,374	12.54	13.45	0	33.83	9.18

5.4 Alaska Airlines Data

Alaska Airlines is a predominant American airline headquartered in SeaTac, Washington, inside the Seattle metropolitan area. It is the fifth-largest airline in the United States when measured through fleet size, scheduled passengers carried, and the number of routes served. Alaska, together with its regional partners Horizon Air and SkyWest Airlines, serves a large domestic route network, primarily targeted at connecting from the Pacific Northwest and Alaska to over one hundred destinations in the contiguous United States, Canada, Hawaii, Costa Rica, and Mexico (Alaska Airlines, 2020). Alaska Airlines operates five hubs, with its major hub located at Seattle/Tacoma. Alaska Airlines is currently a member of One World alliance. Alaska has traditionally been one of the biggest carriers on the West Coast of the United States, with robust presences in Anchorage, Seattle, Portland, and San Diego, serving the three predominant airports in the San Francisco Area and four airports in the Los Angeles metropolitan area.

Regarding the Sabre Intelligence Database (2020), Alaska Airlines marketed 279 different route combinations within the domestic US and 123 different route combinations in International routes. For this research, all the international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 3,162, and for international routes, was 467. Therefore, the total number of observations for Alaska Airlines was 3,629. In Figure 5.7, the total passenger distribution of Alaska Airlines was given for domestic airline routes for a total of 16 quarters, and in Figure 5.8, the passenger distribution of Alaska Airlines was given for international airline routes for 16 quarters period.

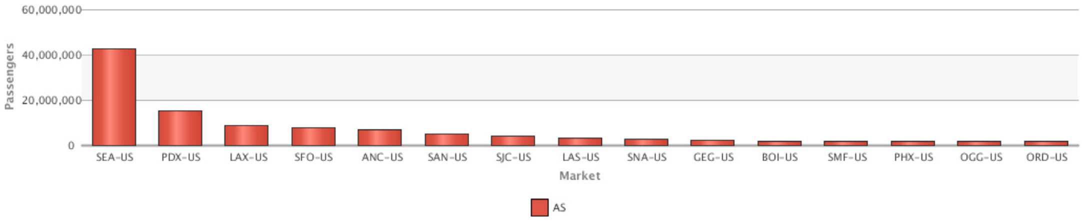


Figure 5.7 Alaska Airlines Domestic Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

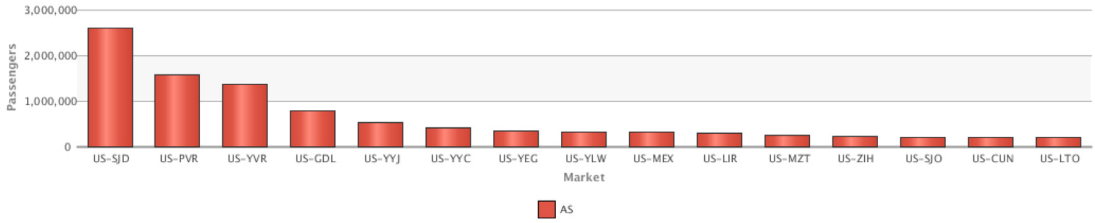


Figure 5.8 Alaska Airlines International Passenger Distribution 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on Alaska Airlines Data obtained from the Sabre Marketing Intelligence database are given in Table 5.4 as follows:

Table 5.4

Alaska Airlines Descriptive Statistics

	Number of Observations	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	3,629	220.25	170.03	106.47	966.28	146.92
Credit Card Expenditure USD	3,629	22,704.08	25,000.00	12,500.00	40,000.00	7,919.46
Passengers	3,629	2,862,764.16	275,887.54	28	11,856,846.00	4,435,372.42
Airline Share %	3,629	2.91	3.56	0.01	5.84	1.93

5.5 Hawaiian Airlines Data

Hawaiian Airlines (Hawaiian: Hui Mokulele ʻo Hawaiʻi) is the flag carrier and the biggest airline in the U.S. state of Hawaii. It is the tenth-largest industrial airline in the US, Capa (2020), and is based in Honolulu, Hawaii. The airline operates its foremost hub at Daniel K. Inouye International Airport on the island of Oʻahu and a secondary hub out of Kahului Airport on the island of Maui. Hawaiian Airlines additionally maintains a crew base at Los Angeles International Airport. Hawaiian Airlines operates flights to Asia, American Samoa, Australia, French Polynesia, Hawaii, New Zealand, and the United States mainland. Hawaiian Airlines operates under Hawaiian Holdings, Inc.

Regarding the Sabre Intelligence Database (2020), Hawaiian Airlines marketed 60 different route combinations within the domestic US and 74 different route combinations in international routes. For this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 577, and for international routes, was 295. Therefore, the total number of observations for Hawaiian Airlines was 872. In Figure 5.9, the total passenger distribution of Hawaiian Airlines was given for domestic airline routes for a total of 16 quarters, and in Figure 5.10, the passenger distribution of Hawaiian Airlines was given for international airline routes for 16 quarters period.

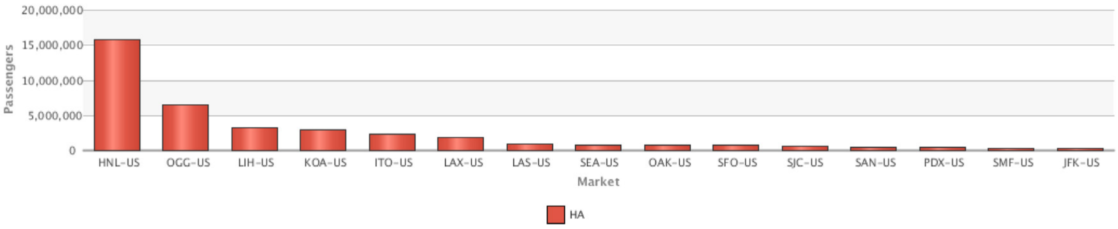


Figure 5.9 Hawaiian Airlines Domestic Passenger Distribution 2016Q1 – 2019Q4

Source: Sabre Marketing Intelligence (2020)

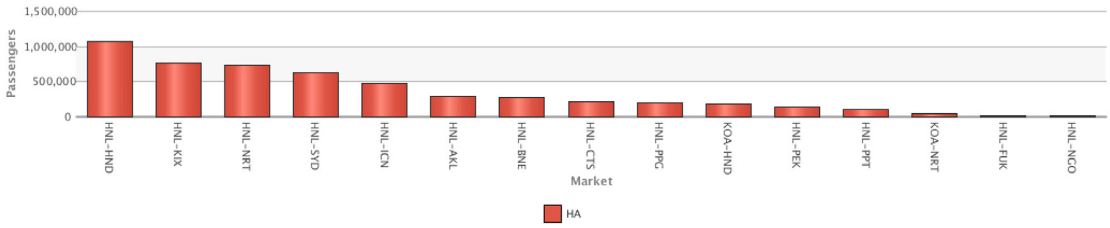


Figure 5.10 Hawaiian International Passenger Distribution 2016Q1 – 2019Q4

Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on Hawaiian Airlines Data obtained from the Sabre Marketing Intelligence database are given in Table 5.5 as follows:

Table 5.5

Hawaiian Airlines Descriptive Statistics

	Number of Observations	**Mean**	**Median**	**Min**	**Max**	**Standard Deviation**
Base Fare USD	872	325.13	422.31	4.07	550.62	177.68
Credit Card Expenditure USD	872	63,250.00	70,000.00	50,000.00	70,000.00	8,166.24
Passengers	872	650,127.81	48,083.94	295	2,622,026.00	1,044,772.19
Airline Share %	872	4.65	4.79	1.21	8.33	2.56

After the collection of airline data both from specific airline frequent flyer web pages and Sabre Marketing Intelligence software database, all the datasets were merged with Adobe Creative Cloud InDesign Software. After the merging, each airline data is classified and formatted following Smart PLS software requirements via Adobe InDesign software. The calculation result of both simulation and structural equation modeling parts of the research is given in Chapter 6.

To verify the findings of the research in Section 6.2, another verification study was conducted in a major touristic hub airport in the US. The MIA airport was selected based on its strong demand for tourism and leisure travel. The SEM model was run in Section 6.3 to verify the findings obtained in Section 6.2 for the big three carriers. As Hawaiian and Alaska Airlines have minimal demand, they were excluded from the verification study. Hence, the summary statistics obtained for Delta, American, and United Airlines were reported separately in Section 6.3 for their MIA operations during the research period.

CHAPTER VI
Results and Discussion

6.1 FFMS Calculation Results

In this part of the dissertation, FFMS ratio simulations of the selected airlines are compared with each other. The main challenge in this dissertation is that no scientific data are available regarding airline miles. The selected airlines' current available scientific data comprise route pricing, revenue, and operational metrics. Furthermore, even if the other four airlines have published their award mileage charts on their official web pages, Delta Air Lines officially discontinued publishing their award mileage chart. In this instance, the datasets for each selected airline were generated with a unique coding methodology by controlling the mileage requirements of each airline for each geographical section regarding dynamic mileage tables. As each airline asks for different award mileages for each cabin class in their flights, the average mileage requirement will be used to calculate the required credit card expenditure for each selected route.

During this research, two different type of data sets are available. The first data set is the mileage requirement of each selected airline route for the selected time period. The second data set includes all of the remaining data. In order to make the calculations, all of the data needs to be merged within a single data set. But regarding the thousands of route combinations, the mileage requirement must match with seasonal ticket prices depending on the geographical location of the flight routes. Furthermore, inclusion of code-share flights increases the airline mileage redemption options significantly. Therefore, because of the complex structure of the airline mileage data, the merging of the data set can only be achieved by computer algorithm. Because of this reason, the Adobe InDesign© software was selected to merge the datasets in this study.

While generating the dataset, first, the net ticket price for each selected route is obtained from the Sabre© Marketing Intelligence database. The net average quarterly ticket price data represent the average ticket price for each selected route. After that, the airline mileage requirement data was merged with the data obtained from Sabre© with a special script coding methodology via Adobe InDesign© software. The Adobe InDesign© is a new-generation journal publishing tool in which complex models can easily be merged together in a single document. Based on this software specification, all calculations and reporting were completed within the Adobe InDesign© software. All simulation and structural equation modeling calculations were run regarding the generated average quarterly FFMS ratios. After merging the datasets, the FFMS ratio for each selected airline was calculated via the formulation (1) given in the methodology section as follows:

$$(FFMS\ Ratio\ )_i = \frac{(Net\ Ticket\ Price)_i}{(Credit\ Card\ Expenditure)_i} \tag{1}$$

Table 6.1 presents the results obtained from the calculation of the FFMS ratio for each specific airline.

Table 6.1

FFMS Descriptive Statistics of Selected Airlines

Airline Name	Minimum	Maximum	Mean	Standard Dev.
Alaska	0.42	2.42	1.03	0.33
Hawaiian	0.005	0.78	0.45	0.18
United	0.17	14.3	3.73	2.07
Delta	0.33	9.01	2.32	1.19
American	0.26	3.59	1.31	0.50

The calculation results represent the maximum and minimum FFMS ratios obtained for different airline routes. Even if this calculation shows that some of the routes marketed by United and Delta Air Lines offer very high FFMS returns, the data were insufficient to offer a robust scientific comparison to the customers because, even if some of the routes have higher FFMS returns, it is unknown what percent of customers can get these higher ratios. This problem generates the following question: if a customer decides to change their credit card selection, what is their chance to obtain a higher FFMS ratio regarding their current credit cards?

As the personal choice of travel significantly varies among passengers, the selected airlines in this study can offer thousands of route combinations, which includes multiple domestic and international transfers both within the airline network and airline code-share alliance network partners. Therefore, it is not possible to analyze a group of passengers' perspectives and generalized these passenger behaviors to the entire aviation system inside the U.S. During this study, @RISK software offered by Palisade Company was used. @RISK is an add-in to Microsoft Excel application that enables risk analysis using Monte Carlo simulation. @RISK shows virtually all possible outcomes for any situation and provides information on how likely they are to occur. This means that researchers can decide their investment decisions based on the risk factor. In the scope of this research @RISK simulation results will enlighten passengers whether it is logical to change their co-branded credit cards based on higher returns or not?

The main contribution of implementing @RISK software within this dissertation is that it shows the possibility of earning higher miles from each different type of credit card included in the study. The outcome of the simulation enlightens us about the possibility of getting a higher average FFMS ratio for each selected airline co-branded credit card. During the calculations, the focus was to determine what percentage of the selected co-branded credit card users had a higher FFMS ratio than the previous credit card users in the FFMS ranking order.

In sections 6.1.1 to 6.1.5, the FFMS ratio distribution for each particular airline was calculated via @RISK Simulation software with 100,000 iterations to find the airline's FFMS percentage fluctuations. The 100,000 iterations enable us to observe the behavior of passengers scientifically. In this chapter, the simulation enables the replication of passenger selection for each selected airline. So, the passengers randomly select the marketed route for each airline. Based on the simulation results, it can be clearly observed that a select percentage of 100,000 passengers has obtained a greater FFMS ratio based on the competitor credit cardholders.

Sections 6.1.1 to 6.1.5 include credit card comparisons based on their previous competitors. Regarding the comparison of different credit cards at once, in this research, a new comparison tool called Expected Marginal FFMS Returns (EMFR) was used in Section 6.1.6, and the correlation of all selected credit cards is given in Table 6.2.

6.1.1 Hawaiian Airlines FFMS Simulation Results

In order to run the simulation model in @RISK software, firstly the details of the historical distribution of the FFMS ratio is needed. The simulation program requires the distribution type as an input parameter in order to replicate the movement of a select 100,000 passengers within the airline marketed route network. In this instance the distribution fitting becomes an essential tool to conduct research on the historical data.

Distribution fitting is the fitting of a probability distribution to a series of data concerning the repeated measurement of a variable phenomenon. The aim of distribution fitting in this research is to predict the probability or to forecast the frequency of occurrence of the magnitude of the phenomenon in a certain interval. There are many probability distributions of which some can be fitted more closely to the observed frequency of the data than others, depending on the characteristics of the phenomenon and of the distribution. The distribution giving a close fit is supposed to lead to good predictions. In distribution fitting, therefore, one needs to select a distribution that suits the data well. But as the distribution fitting is a complex mathematical process, special tools are needed to fit the historical data of our selected five airlines for this research.

In scope of this research @RISK software was selected to use distribution function of the selected airlines. @RISK software uses Maximum Likelihood Estimators (MLE's) in general calculations. But it's important to realize that not all distributions are fit in exactly the same way. In this instance, @RISK simulation program includes many proprietary alterations to the standard algorithms in order to do a better job of fitting particular distributions. This special feature let the fitting function proceed more efficiently, handle cases where the standard MLE algorithms break down, and so on.

Based on the summary statistics, Hawaiian Airlines has 872 historical observations. Therefore, the fitting function was run with 872 data points. Afterwards the simulation was run for a select of 100,000 passengers. The simulation results for Hawaiian Airlines are given in the Figure 6.1 as follows;

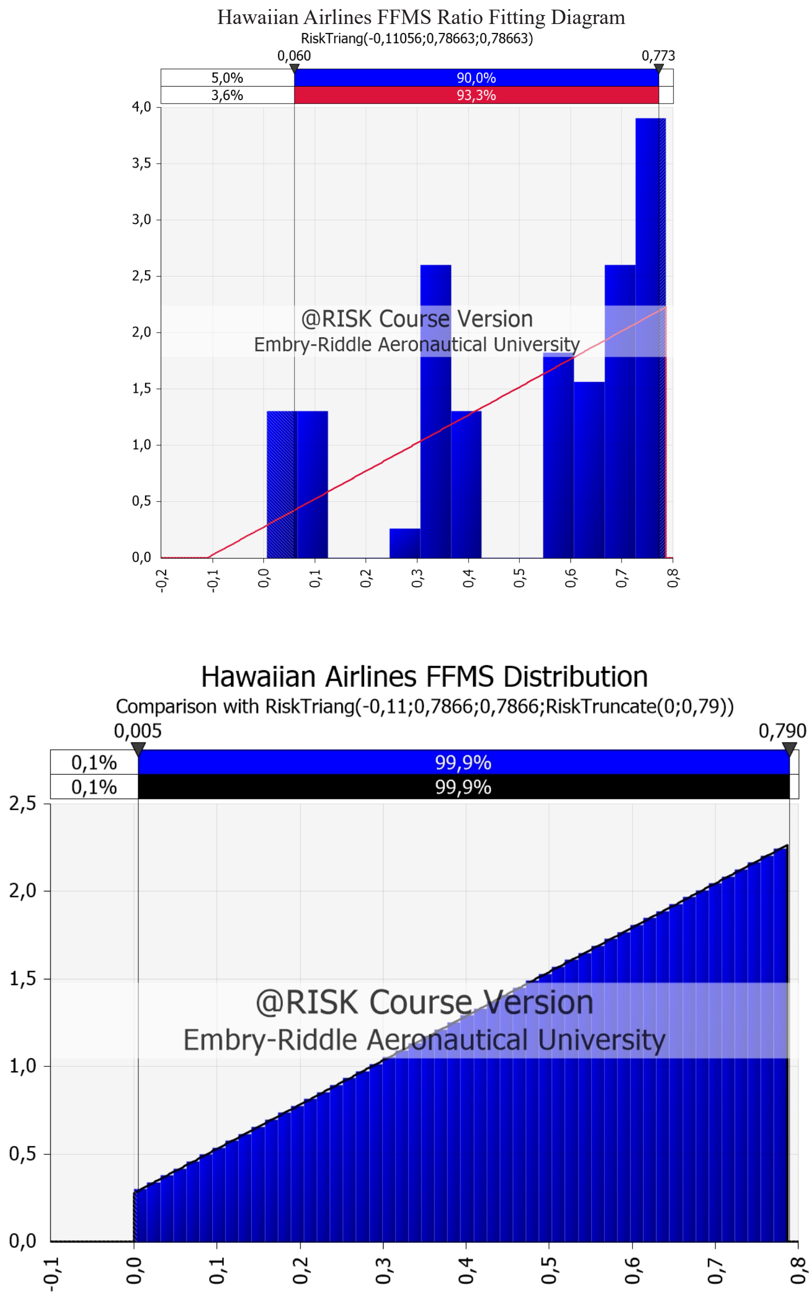


Figure 6.1 Hawaiian Airlines FFMS Simulation Distributions

Based on the fitting calculation, the historical Hawaiian Airlines FFMS ratio represents a triangular distribution schematic. Regarding the simulation results, the FFMS ratio was calculated as a minimum 0.005% and maximum 0.79% band. These maximum and minimum ratios can be seen in the top chart of Figure 6.1. The FFMS ratio calculated here represents how much these passengers can save from daily credit card expenditures. The maximum FFMS ratio for Hawaiian Airlines was found to be 0.79%. Therefore, if a passenger decides to invest in Hawaiian Airlines World Elite MasterCard for his award travel needs, they will save a maximum of 0.79 cents for future airline tickets for each $100 expenditure from the credit card. So the customer cannot even save a dollar worth of a return when they spent $ 100. All of the airline's FFMS simulation results were given in ascending order in this research section. As Hawaiian Airlines has the least FFMS value distribution, it cannot be compared with other airlines in this section. The respective comparison results were given for other airlines in the FFMS simulations by highlighting the difference of maximum FFMS ratios obtained by every specific airline in sections 6.1.2 to 6.1.5.

6.1.2 Alaska Airlines FFMS Simulation Results

Based on the summary statistics, Alaska Airlines has 3,629 historical observations. Therefore, the fitting function was run with 3,629 data points. Afterwards the simulation was run for a select of 100,000 passengers. The simulation results for Alaska Airlines are given in the Figure 6.2 as follows;

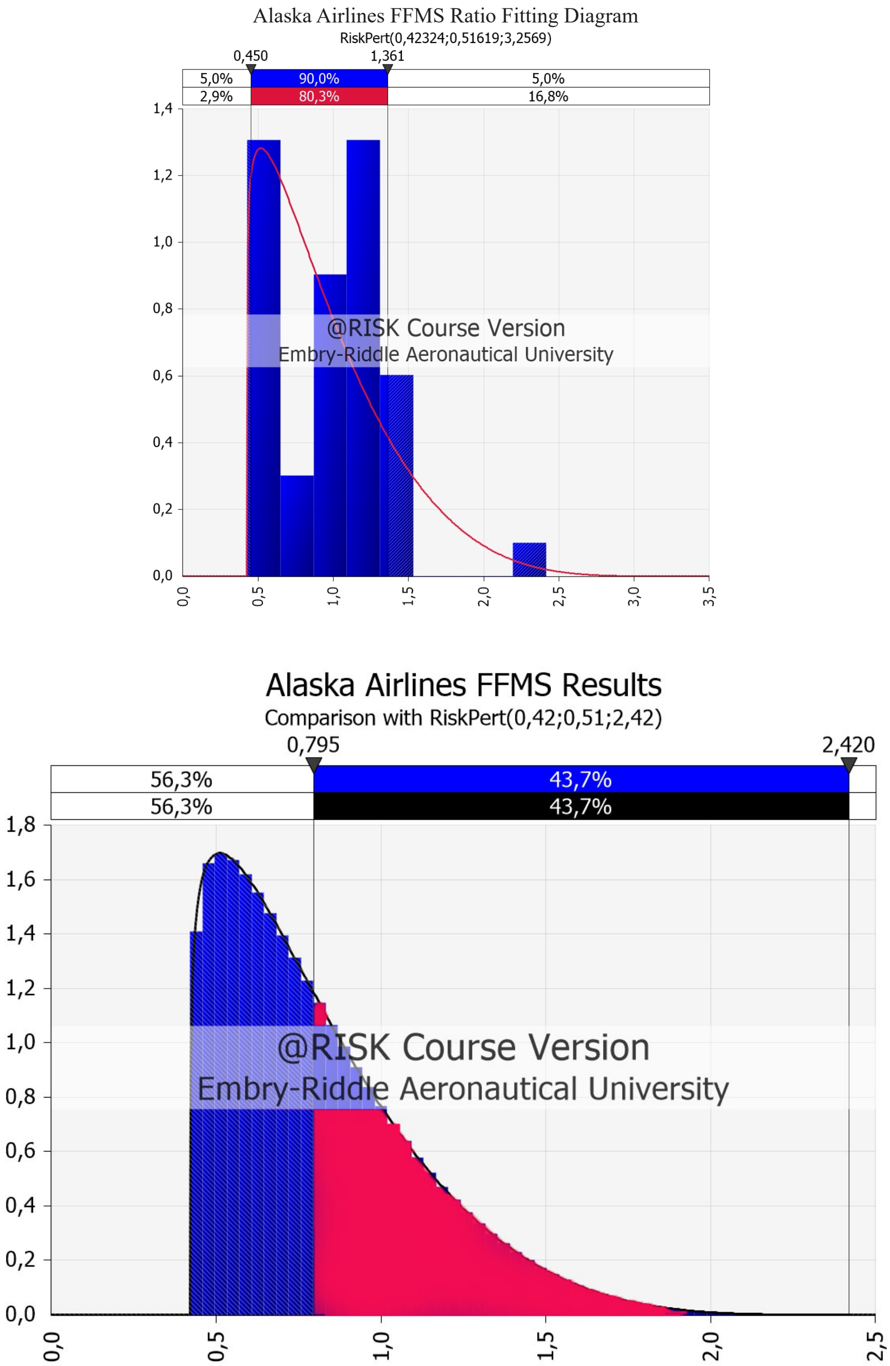


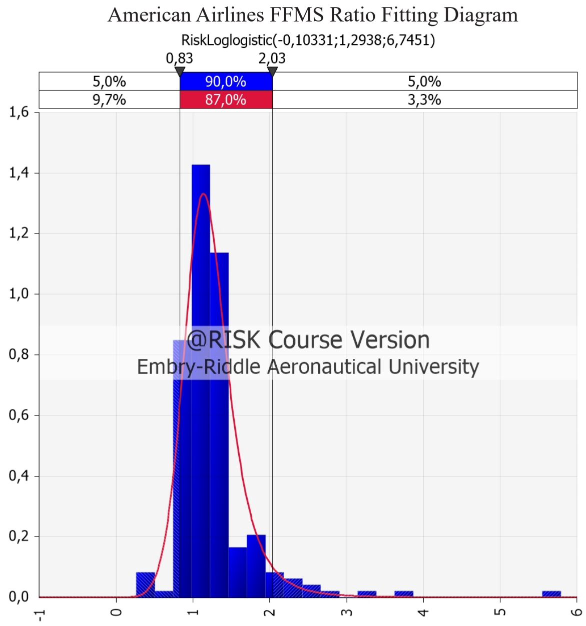
Figure 6.2 Alaska Airlines FFMS Simulation Distributions

Based on the fitting calculation, the historical Alaska Airlines FFMS ratio represents a pert distribution schematic. Regarding the simulation results, the FFMS ratio was calculated as a minimum 0.42% and maximum 2.42% band. These maximum and minimum ratios can be seen in the top chart of Figure 6.2. The FFMS ratio calculated here represents how much these passengers can save from daily credit card expenditures. The maximum FFMS ratio for Alaska Airlines was found to be 2.42%. Therefore, if a passenger decides to invest in Alaska Airlines Visa Signature Card for his award travel needs, they will save a maximum of $2.42 for future airline tickets for each $100 expenditure from the credit card.

Regarding the Figure 6.2, the simulation of the Alaska Airlines was run with pert distribution based on the fitting information obtained from the historical data. The result graphic of the simulation is also a pert diagram. In order to calculate what percentage of the customers that are able to receive more savings than Hawaiian Airlines maximum FFMS ratio, firstly the Maximum FFMS ratio of Hawaiian Airlines was marked on the Alaska Airlines curve. Then a red highlighted area was illustrated on the figure. The red highlighted area represents what percentage of customers can receive higher FFMS returns above the maximum FFMS return of Hawaiian Airlines customers. This red area's boundaries start from the maximum FFMS ratio of the previous airline (0.79%) and finish with the maximum value of Alaska Airlines (2.42%). The simulation program automatically calculates what percentage of customers fit in this region. According to the graphic results given in the blue highlighted chart on top of the simulation distribution, 43.7% of the passenger's frequent flyer mile savings are greater than the maximum Hawaiian Airlines Savings. Furthermore, the maximum FFMS ratio of Alaska Airlines is 204.04% more than the Hawaiian Airlines FFMS ratio. So, as each passenger has an 43.7% chance of obtaining higher savings, it is reasonable to invest in the Alaska Airlines Visa Signature Card instead of the Hawaiian Airlines World Elite MasterCard.

6.1.3 American Airlines FFMS Simulation Results

Based on the summary statistics, American Airlines has 6,498 historical observations. Therefore, the fitting function was run with 6,498 data points. Afterwards the simulation was run for a select of 100,000 passengers. The simulation results for American Airlines are given in the Figure 6.3 as follows;



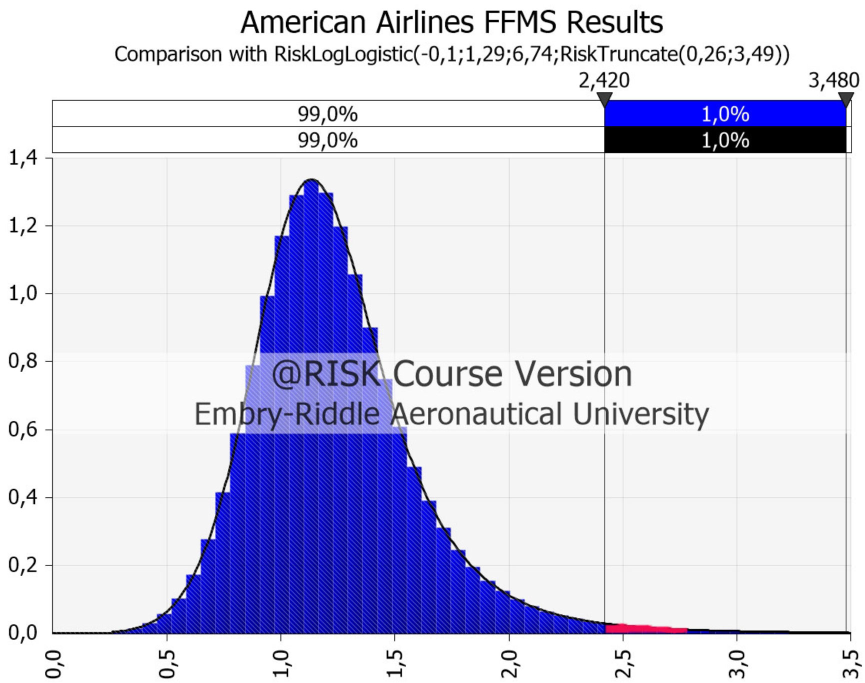


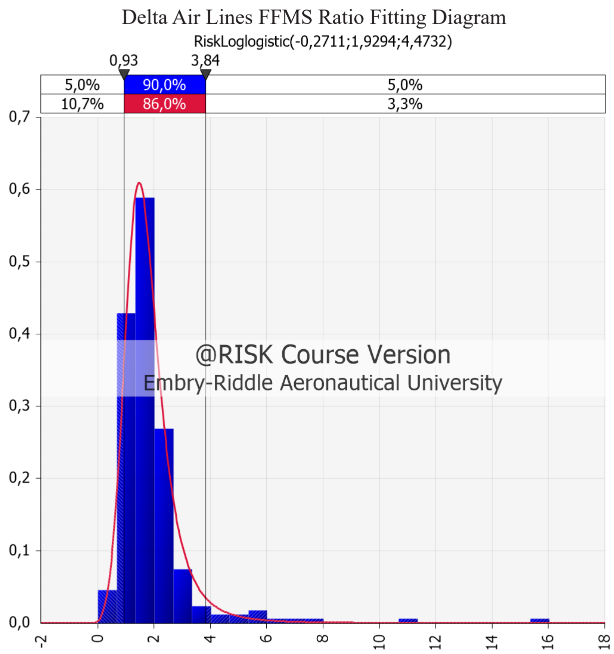
Figure 6.3 American Airlines FFMS Simulation Distribution

Based on the fitting calculation, the historical American Airlines FFMS ratio represents a log-logistic distribution schematic. Regarding the simulation results, the FFMS ratio was calculated as a minimum 0.26% and maximum 3.49% band. These maximum and minimum ratios can be seen in the top chart of Figure 6.3. The FFMS ratio calculated here represents how much these passengers can save from daily credit card expenditures. The maximum FFMS ratio for American Airlines was found to be 3.49%. Therefore, if a passenger decides to invest in American Airlines Credit Card for his award travel needs, they will save a maximum of $3.49 for future airline tickets for each $100 expenditure from the credit card.

Regarding the Figure 6.3, the simulation of the American Airlines was run with log logistic distribution based on the fitting information obtained from the historical data. The result graphic of the simulation is also a log logistic diagram. In order to calculate what percentage of the customers are able to receive more savings than Alaska Airlines maximum FFMS ratio, firstly the Maximum FFMS ratio of Alaska Airlines was marked on the American Airlines curve. Then a red highlighted area was illustrated on the figure. The red highlighted area represents what percentage of customers can receive higher FFMS returns above the maximum FFMS return of Alaska Airlines customers. This red area's boundaries start from the maximum FFMS ratio of the previous airline (2.42%) and finish with the maximum value of American Airlines (3.49%). The simulation program automatically calculates what percentage of customers fit in this region. According to the graphic results given in the blue highlighted chart on top of the simulation distribution, only 1.0% of the passenger's frequent flyer mile savings are greater than the maximum Alaska Airlines Savings. However, the maximum FFMS ratio of American Airlines is 44.81% more than that of Alaska Airlines. So, each passenger has a 1.0% chance to obtain higher savings, but the ratio of the possible savings is 44.21% higher than the maximum simulated Hawaiian FFMS return. Therefore, it is reasonable to invest in the AAdvantage Credit Card instead of the Alaska Airlines Visa Signature Card even if the chance is limited.

6.1.4 Delta Air Lines FFMS Simulation Results

Based on the summary statistics, Delta Air Lines has 6,250 historical observations. Therefore, the fitting function was run with 6,250 data points. Afterwards the simulation was run for a select of 100,000 passengers. The simulation results for Delta Air Lines are given in the Figure 6.4 as follows;



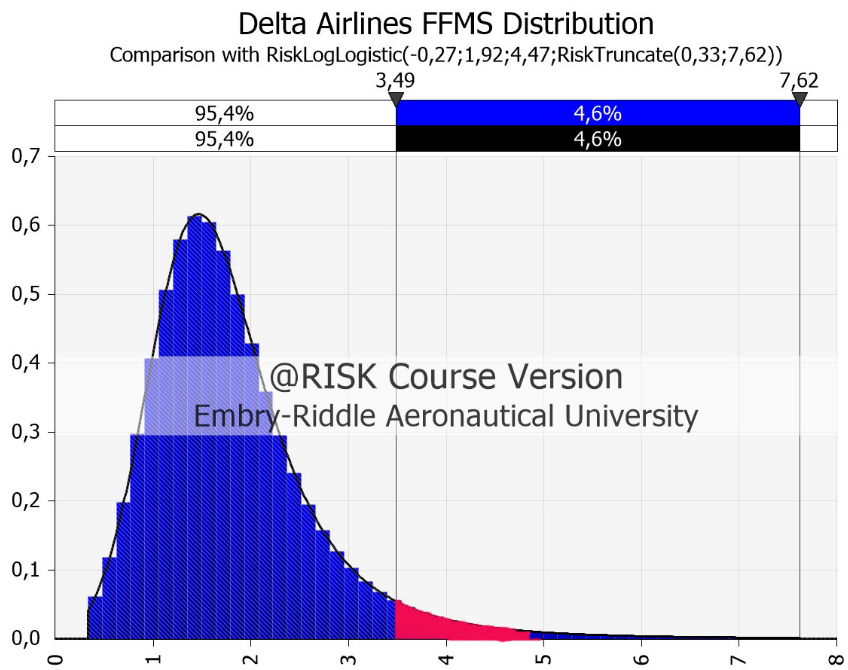


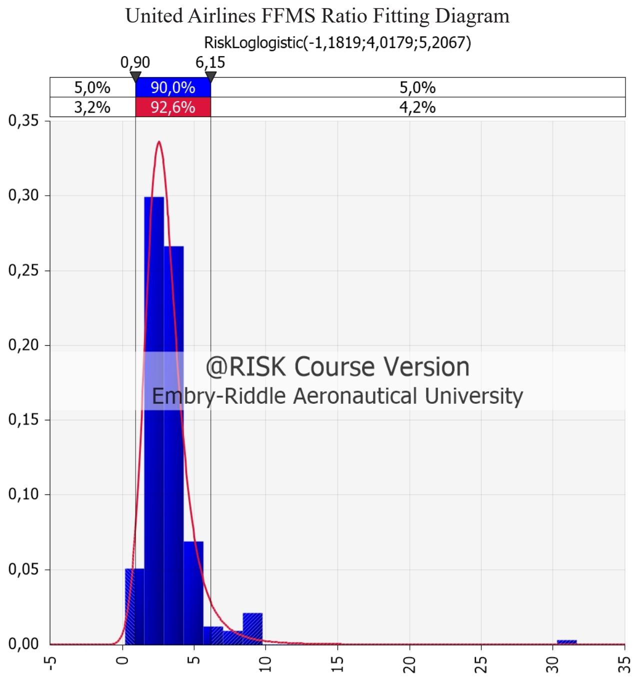
Figure 6.4 Delta Air Lines FFMS Simulation Distribution

Based on the fitting calculation, the historical Delta Air Lines FFMS ratio represents a log-logistic distribution schematic. Regarding the simulation results, the FFMS ratio was calculated as a minimum 0.33% and maximum 7.62% band. These maximum and minimum ratios can be seen in the top chart of Figure 6.4. The FFMS ratio calculated here represents how much these passengers can save from daily credit card expenditures. The maximum FFMS ratio for Delta Air Lines was found to be 7.62%. Therefore, if a passenger decides to invest in Delta American Express Sky Miles Credit Card (all Gold, Platinum and Reserve types), for his award travel needs, they will save a maximum of $7.62 for future airline tickets for each $100 expenditure from the credit card.

Regarding the Figure 6.4, the simulation of the Delta Air Lines was run with log logistic distribution based on the fitting information obtained from the historical data. The result graphic of the simulation is also a log logistic diagram. In order to calculate what percentage of the customers are able to receive more savings than American Airlines maximum FFMS ratio, firstly the Maximum FFMS ratio of American Airlines was marked on the Delta Air Lines curve. Then a red highlighted area was illustrated on the figure. The red highlighted area represents what percentage of customers can receive higher FFMS returns than the maximum FFMS return of American Airlines customers. This red area's boundaries start from the maximum FFMS ratio of the previous airline (3.49%) and finish with the maximum value of Delta Air Lines (7.62%). The simulation program automatically calculates what percentage of customers fit in this region. According to the graphic results given in the blue highlighted chart on top of the simulation distribution, 4.6% of the passenger's frequent flyer mile savings are greater than the maximum American Airlines Savings. Furthermore, the maximum FFMS ratio of Delta Air Lines is 118.33% more than the American Airlines FFMS ratio. So, as each passenger has a 4.6% chance of obtaining higher savings, it is reasonable to invest in Delta American Express Sky Miles Credit Card instead of previously stated co-branded credit cards.

6.1.5 United Airlines FFMS Simulation Results

Based on the summary statistics, United Airlines has 6,374 historical observations. Therefore, the fitting function was run with 6,374 data points. Afterwards the simulation was run for a select of 100,000 passengers. The simulation results for United Airlines are given in the Figure 6.5 as follows;



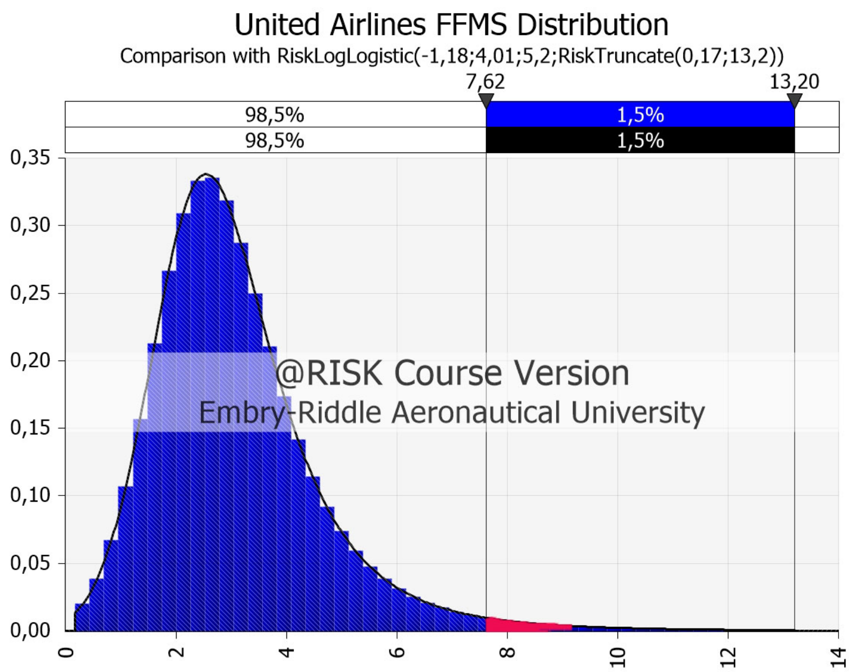


Figure 6.5 United Airlines FFMS Simulation Distribution

Based on the fitting calculation, the historical United Airlines FFMS ratio represents a log-logistic distribution schematic. Regarding the simulation results, the FFMS ratio was calculated as a minimum 0.17% and maximum 13.20% band. These maximum and minimum ratios can be seen in the top chart of Figure 6.5. The FFMS ratio calculated here represents how much these passengers can save from daily credit card expenditures. The maximum FFMS ratio for United Airlines was found to be 13.20%. Therefore, if a passenger decides to invest in the United Mileage Plus Club Credit Card for his award travel needs, they will save a maximum of $7.62 for future airline tickets for each $100 expenditure from the credit card.

Regarding the Figure 6.5, the simulation of the United Airlines was run with log logistic distribution based on the fitting information obtained from the historical data. The result graphic of the simulation is also a log logistic diagram. In order to calculate what percentage of the customers are able to receive more savings than Delta Air Lines maximum FFMS ratio, firstly the Maximum FFMS ratio of Delta Air Lines was marked on the United Airlines curve. Then a red highlighted area was illustrated on the figure. The red highlighted area represents what percentage of customers can receive higher FFMS returns than the maximum FFMS return of Delta Air Lines customers. This red area's boundaries start from the maximum FFMS ratio of the previous airline (7.62%) and finish with the maximum value of United Airlines (13.20%). The simulation program automatically calculates what percentage of customers fit in this region. According to the graphic results given in the blue highlighted chart on top of the simulation distribution, 1.5% of the passenger's frequent flyer mile savings is greater than the maximum Delta Air Lines Savings. However, the maximum FFMS ratio of United Airlines is 73.22% more than the Delta Air Lines FFMS ratio. So, each passenger has a 1.5% chance to obtain higher savings, but the ratio of the possible savings is 73.22% higher than the maximum simulated Delta Air Lines FFMS return. Therefore, it is reasonable to invest in the United Airlines Mileage Plus Club Credit Card, which offers the best FFMS ratio and enables passengers to fly to their desired travel destination with less credit card expenditure.

In Sections 6.1.1 to 6.1.5, each credit card's relative comparison was given according to its previous competitor's credit card. To compare all credit cards at once, another approach is used in section 6.1.6.

6.1.5 Expected Marginal FFMS Comparison

In Sections 6.1.1 to 6.1.5, different credit card FFMS returns were compared with their previous competitor credit cards based on the possibility of obtaining higher FFMS returns and the difference among the highest FFMS ratios. However, the correlation among other credit cards was missing, such as the correlation between Alaska and Delta Air Lines FFMS distributions. To provide the entire credit card correlation, another approach was used in this section of the study.

To compare different FFMS ratios earning possibilities of different selected credit cards, a new comparison methodology called Expected Marginal FFMS Returns (EMFR) was used in Table 6.2. The correlations in Table 6.2 were calculated by multiplying the chance of obtaining a higher FFMS ratio for each selected airline and the difference in the maximum FFMS ratio for each carrier. The mathematical formulation of the EMFR method is as follows:

Correlation Coefficient = Chance of Obtaining a Higher FFMS Ratio in percentage × Difference between Maximum FFMS Ratios in percentage

Both the chance of obtaining a higher FFMS ratio and the Difference between Maximum FFMS ratios were obtained directly from simulation output. In the matrix shown in Table 6.2, all selected types of co-branded credit cards were classified as a matrix correlation, which shows the expected marginal possibility of earning higher mileage savings.

Table 6.2

Airline Co- Branded Credit Card Correlation Matrix

	Desired Credit Card				
Owned Card	Hawaiian	Alaska	American	Delta	United
Hawaiian	1	4.35	6.32	14.33	25.18
Alaska	0.23	1	1.45	3.30	5.79
American	0.05	0.69	1	2.27	3.98
Delta	0.01	0.47	0.44	1	1.76
United	0.00	0.33	0.19	0.57	1

Regarding Table 6.2, Airline Co-Branded credit cards are compared with each other regarding possibility ratios obtained from @RISK software. In Table 6.2, if the observed coefficient is higher than 1, passengers can earn higher FFMS returns. If the observed coefficient is below 1, the passenger will have a lower FFMS return. The coefficient of 1 indicates that the passenger is using the same credit card. Therefore, based on the correlation coefficients, the ranking of airline co-branded credit cards based on their EMFR returns is shown as follows:

United Mileage Plus Club > Delta American Express Sky Miles > AAdvantage > Alaska Airlines Visa Signature > Hawaiian World Elite Mastercard.

6.2 Structural Equation Modeling Results

According to previous research, this dissertation has a unique feature of using a structural equation modeling methodology to investigate the effect of route structure on the FFMS ratio for selected airlines. Regarding this research, structural equation modeling was preferred to analyze the structural relationship between the measured variables and latent constructs. This method is desirable because it estimates multiple and interrelated dependencies in a single analysis.

This study's SEM model is presented as an exploratory model because there is no previous analytical SEM model used for airline loyalty programs in the literature. In this research, the relationship between the route structure and FFMS ratio was investigated for selected airlines. The latent variable of route structure reflects the infrastructure capacity of a selected airline on a particular route. This capacity includes aircraft variations, flight frequency and availability of airport facilities. So, regarding thousands of route combinations within this study, it is not possible to measure all of these effects individually. Therefore, the latent variable of route structure was defined to represent all of these specifications within a particular flight route. This latent variable's observed outcome is accepted as the total number of passengers carried and the market share of airlines. The other latent variable is the frequent flyer program, directly representing the FFMS ratio.

The Smart PLS results for each selected airline are given in Subsections 6.2.1 to 6.2.5, as follows:

6.2.1 Hawaiian Airlines Structural Equation Modeling Results

The structural equation modeling results are given in the Figure 6.6 as follows;

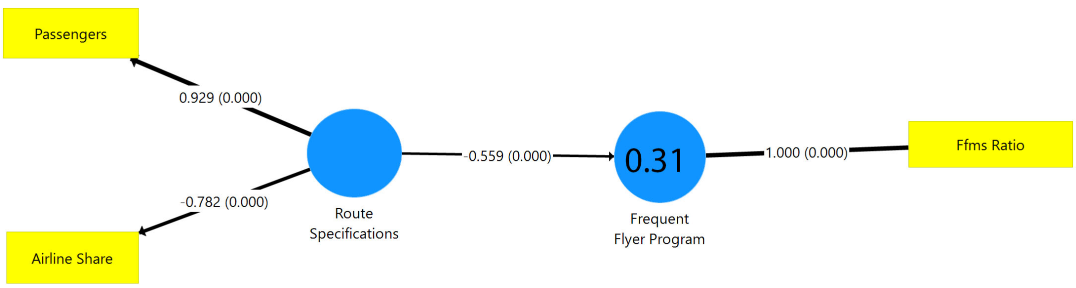


Figure 6.6 Hawaiian Airlines Structural Equation Model Results with P statistical values

Note: Numbers given in parenthesis represents the P statistical values for all SEM Figures.

Regarding this SEM modeling, all the observed coefficients are significant at 95% ratio. So all the coefficients are significant enough to be considered. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 31% of the observed variables in the research.

Detailed Statistical Analysis of Hawaiian Airlines SEM Modeling results are given in Tables 6.3, 6.4, and 6.5, as follows:

Table 6.3

Hawaiian Airlines SEM Model Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.768	0.788	0.742	0.737

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.4

Hawaiian Airlines SEM Model Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	-0.559
Passengers	-0.576	0.929
Airline Share	0.341	-0.782

Table 6.5

Hawaiian Airlines SEM Model Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.559	0.859
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.651	

Regarding the statistical calculations made in Table 6.3 for Hawaiian Airlines SEM Modeling, the Cronbach's alpha coefficients exceed 0.7. So, it can be said that the model is valid according to the coefficients obtained from the validity section. The collinearity statistics also indicate that no straight correlation exists between the latent variables.

According to the SEM results obtained in Table 6.5, discriminant validity was achieved for the model based on Fornell–Larcker criteria and the Heterotrait Monotrait Ratio (HTMT) tresholds. Therefore, it is accepted that discriminant validity is achieved.

Even if the structural model of Hawaiian Airlines was found to be valid, the different correlation signs obtained for Airline Share and Passenger numbers require verification by further calculation to make inferences regarding the findings. In Figures 6.7 and 6.8, the SEM model for Hawaiian Airlines was recalculated again by separating Route Specification variables. After the separation, the program was recalculated individually for both of the variables.

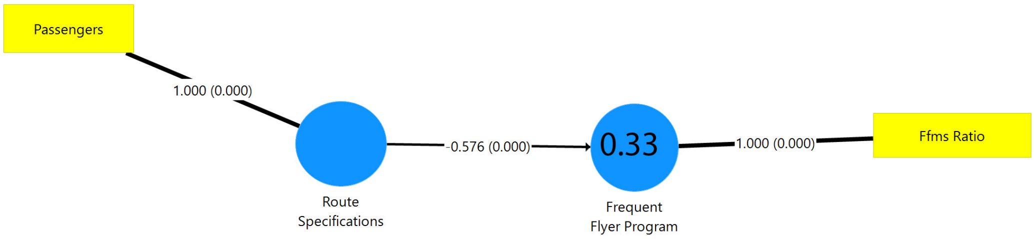


Figure 6.7 Hawaiian Airlines Structural Equation Model Result for Passenger Data

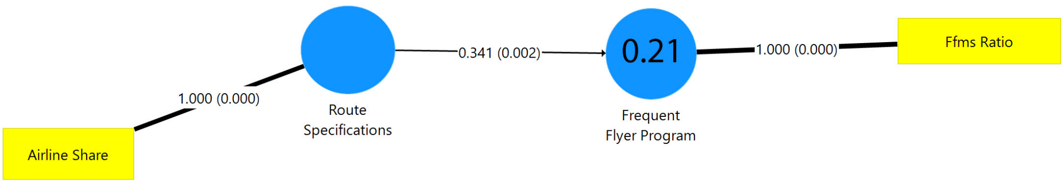


Figure 6.8 Hawaiian Airlines Structural Equation Model Result for Airline Share Data

Regarding the overall results, the route specification strongly and negatively affects the Frequent Flyer Program Specification in the general model; however, when investigated individually, the passenger numbers negatively correlate with the FFMS ratio, whereas the airline share has a positive connection.

The reason for obtaining different signs in the path coefficients may be related to the unique operational structure of Hawaiian Airlines. They concentrate their operations on a single hub in Oahu Island in the State of Hawaii, located in the middle of the Pacific Ocean. Therefore, operations to these islands are difficult for other carriers based in the continental US. So, Hawaiian Airlines has a monopolistic market share, especially for inter-island connections.

According to Curran (2019), local island services around Hawaii have traditionally been Hawaiian Airlines' domain. Like many local carriers operating out of small island states and nations, Hawaiian Airlines has long reaped incumbency benefits and is a sizeable airline at Honolulu International Airport. The airline gained a well-deserved reputation for market dominance and high fares. The Honolulu-based airline has long had a near monopoly position on these routes. The author stated that Hawaiian Airlines had 98% of the inter-island transportation market share before Southwest Airlines landed in the second half of 2019. According to Curran, Southwest Airlines' entry into the market did not affect Hawaiian Airlines' pricing strategy. The top pricing strategy remains the same. Based on this monopolistic pricing strategy, it can be inferred that Hawaiian Airline's FFMS ratio could be artificially inflated because their average prices are much higher on these monopoly routes. Furthermore, the monopolistic competition can explain the positive correlation between Airline Share and the FFMS ratio.

Regarding the relationship between the number of passengers and the FFMS ratio, as the number of passengers increases, the FFMS ratio goes down.

6.2.2 Alaska Airlines Structural Equation Modeling Results

The structural equation model results are given in Figure 6.9 as follows;

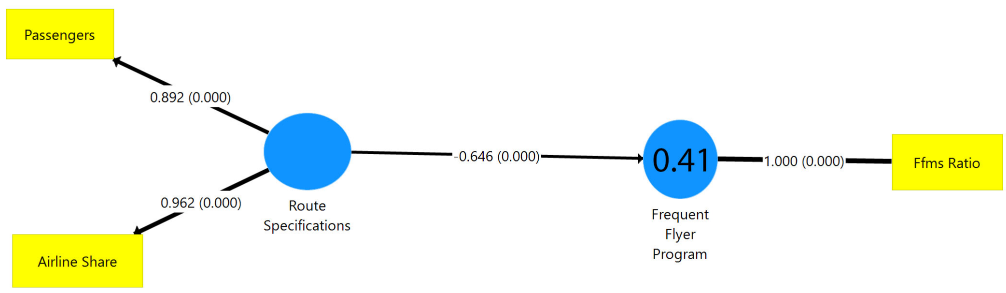


Figure 6.9 Alaska Airlines Structural Equation Model Results with P statistical values

Regarding this SEM modeling, all the observed variables have a significant coefficient at 95% ratio. So, all the coefficients are significant enough to be considered. According to the latent variables R square statistics of Frequent Flyer Program, this SEM model helps explain 41% of the observed variables in the research.

Detailed statistical analysis of Alaska Airlines SEM modeling results are given in Tables 6.6, 6.7, and 6.8, as follows:

Table 6.6

Alaska Airlines SEM Model Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.847	0.967	0.925	0.860

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.7

Alaska Airlines SEM Model Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	-0.646
Passengers	-0.429	0.892
Airline Share	-0.710	0.962

Table 6.8

Alaska Airlines SEM Model Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.646	0.928
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.665	

Regarding the statistical calculations made in Table 6.6 for Alaska Airlines SEM modeling, the Cronbach's Alpha coefficients exceed 0.7. So, it can be said that the model is valid according to the coefficients obtained from validity section.

According to the SEM results obtained in Table 6.8, discriminant validity was achieved for the model based on Fornell–Larcker criteria and the Heterotrait Monotrait Ratio (HTMT). Based on the findings, discriminant validity was established for this model.

The SEM calculation of Alaska Airlines revealed a strong negative path coefficient between Route Specifications and FFMS ratio variables. So, the customers of Alaska Airlines can receive higher FFMS returns when they prefer to fly on the routes that have a lower customer demand and a lower market share. This finding is related to the law of demand. The law of demand in aviation is one of the most fundamental concepts in airline ticket pricing. It works with the law of supply to explain how market economies allocate resources and determine the prices of goods and services that we observe. The law of demand in aviation states that the quantity purchased varies inversely with price. Alternatively, the higher the price, the lower seats demanded. Regarding this research, as the ticket prices increase for the markets in which Alaska Airlines has a lower market share, the ticket prices for low-demanded international routes are higher than those of high-demanded domestic destination tickets. So, the correlation between route specification and FFMS ratio was found to be negative.

6.2.3 American Airlines Structural Equation Modeling Results

The structural equation modeling results are given in Figure 6.10 as follows;

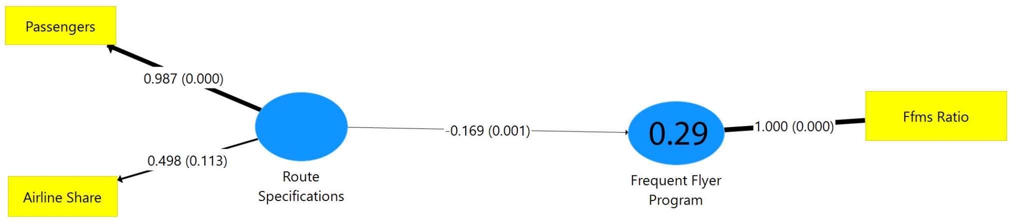


Figure 6.10 American Airlines Structural Equation Model Results with P statistical values

Regarding this SEM modeling, all the observed coefficients were significant at 95% ratio. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 29% of the observed variables in the research. The loading of airline share was found to be 0.498 which is below the suggested threshold of .70 but is within the tolerance for acceptance for exploratory research (Hair et all., 2016).

Detailed statistical analysis of American Airlines SEM modeling results are given in Tables 6.9, 6.10, and 6.11 as follows:

Table 6.9

American Airlines SEM Model Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specification	0.752	0.775	0.739	0.611

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.10

American Airlines SEM Model Cross Loadings Analysis

	Frequent Flyer Program	Route Specification
FFMS Ratio	1.000	-0.169
Passengers	-0.177	0.987
Airline Share	-0.032	0.498

Table 6.11

American Airlines SEM Model Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.169	0.782
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.176	

Regarding the statistical calculations made in Table 6.9 for American Airlines SEM modeling, the Cronbach's Alpha coefficients exceed 0.7. So, it can be said that the model is valid according to the coefficients obtained from the validity section.

According to the SEM results obtained in Table 6.11, discriminant validity was achieved for the model based on the Fornell–Larcker criteria and the Heterotrait Monotrait Ratio (HTMT) results.

Based on the SEM model outputs, the route specifications and the FFMS ratio had a weak, but significant, negative correlation. Compared to the Alaska Airlines path coefficient, the path coefficient of American Airlines was found negative also but not as strong. This finding may be related to the network structure of American Airlines. As a member of the big three carriers, the route network capacity, hub connections, and number of carried passengers are multiple times higher for American Airlines compared to Alaska and Hawaiian Airlines.

As such, American Airlines offers multiple connections and transfer possibilities via its nine different major hubs and offers various tickets for each desired route that are more flexible than Alaska Airlines. Therefore, an increase in the passenger demand and market share diminishes the FFMS ratio more significantly for Hawaiian and Alaska Airlines.

6.2.4 Delta Air Lines Structural Equation Modeling Results

The structural equation model results are given in Figure 6.11 as follows:

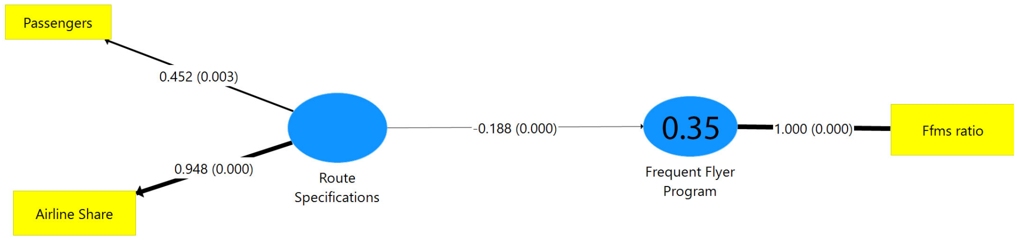


Figure 6.11 Delta Air Lines Structural Equation Model Results with P statistical values

Regarding this SEM modeling, all the observed coefficients are significant at the 95% ratio. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 35% of the observed variables in the research. Similar to American Airlines, the loading of passengers for Delta is low at 0.452 but within the acceptable range for exploratory research (Hair et al., 2016).

Detailed statistical analysis of Delta Air Lines SEM modeling results are given in Tables 6.12, 6.13, and 6.14 as follows:

Table 6.12

Delta Air Lines SEM Model Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.725	0.741	0.768	0.551

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.13

Delta Air Lines SEM Model Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	-0.188
Passengers	-0.066	0.452
Airline Share	-0.185	0.948

Table 6.14

Delta Air Lines SEM Model Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.188	0.743
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.330	

Regarding the statistical calculations made in Table 6.12 for Delta Air Lines SEM modeling, the Cronbach's Alpha coefficients of Frequent Flyer Program and Route Specifications exceed 0.7.

According to the SEM results obtained in Table 6.14, discriminant validity was achieved for the model based on the Fornell–Larcker criteria and the Heterotrait Monotrait Ratio (HTMT) results. According to the SEM results obtained in this section, the route specification has a weak negative, but significant, effect on the FFMS ratio similar to American Airlines.

Based on the findings obtained for Delta and American Airlines, their path coefficients between route structure and FFMS ratio were under -0.20 level. Meanwhile the path coefficients of Hawaiian and Alaska airlines were above the -0.5 level. Therefore, an increase in the passenger numbers and market share, has a higher negative impact on the FFMS ratio for these smaller airlines.

6.2.5 United Airlines Structural Equation Modeling Results

The structural equation modeling results are given in Figure 6.12 as follows:

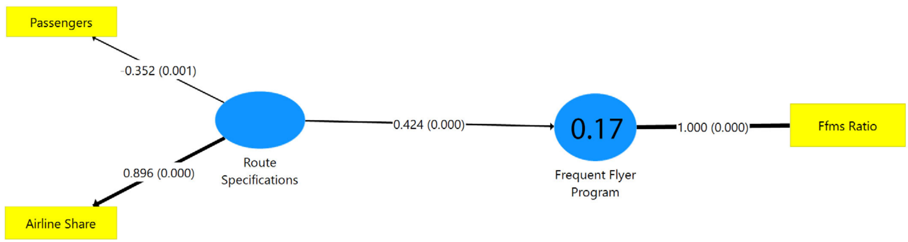


Figure 6.12 United Airlines Structural Equation Model Results with P statistical values

Regarding this SEM modeling, all the latent variable connection coefficients are significant at 95% ratio. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 17% of the observed variables in the research.

Detailed statistical analysis of United Airlines SEM modeling results are given in Tables 6.15, 6.16, and 6.17 as follows:

Table 6.15

United Airlines SEM Model Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.181	-0.278	0.217	0.464

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.16

United Airlines SEM Model Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	0.424
Passengers	-0.174	-0.352
Airline Share	0.368	0.896

Table 6.17

United Airlines SEM Model Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	0.424	0.681
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.860	

According to the SEM results obtained in Table 6.17, discriminant validity was achieved for the model based on the Fornell–Larcker criteria. Regarding the Heterotrait Monotrait Ratio (HTMT) results, one measurement is above 0.85 level, which is accepted as violation of discriminant validity based on Kline (2011) assumptions. However, based on Gold et al. (2001), discriminant validity can be achieved for measurements below 0.90. Based on these two theories, less conservative theory from Gold et al. (2001) was used to control the SEM result. Therefore, it is accepted that the discriminant validity was achieved. However, regarding the statistical calculations made in Table 6.15 for United Airlines SEM modeling,all of the measurements of validity and reliability are below the proper tresholds. Thus no inferences can be determined.

In this section, the SEM model of the selected airlines was calculated for the airlines' entire network. The selected airlines' data include all marketed tickets of the airlines between the first quarter of 2016 and the last quarter of 2019, with a total of 16 quarterly periods. Based on the findings, the SEM calculations of all airlines except United Airlines were found valid. The relationship among route structure and FFMS ratio was found to be negative in each valid model. However, only the relationship between the airline share and FFMS ratio was found to be positive for Hawaiian Airlines. This finding most likely related to the monopolistic market of Hawaiian Airlines.

As this research is the first study that uses the SEM model to investigate the relationships of frequent flyer miles with other variables quantitatively, the obtained results cannot be benchmarked with another study. Before making a final conclusion, the study findings should be benchmarked further. Thus, to verify the findings, more research was conducted at a single airport level for the big three airlines whose market share differed from each other during the original observation period. The results of this study are given in detail in Section 6.3.

6.3 Verifying the SEM Modeling Results

In Section 6.2, the SEM modeling results were calculated for each selected airline based on all of its global marketed tickets. The findings indicate that smaller-scale airlines, where their operations are concentrated in a few hubs, have a higher negative relation between route characteristics and the FFMS ratio. Meanwhile, the association between route specifications and FFMS ratio is less strong for American Airlines and Delta Air Lines. Before concluding the findings obtained in Section 6.2, more extensive research was needed to verify the findings. As the models in Section 6.2 were run for the entire marketed tickets of the selected airlines, in this section, the last part's findings are verified by running the SEM modeling of just a single airport hub.

Selection of a single hub airport is a crucial decision in this part of the research because, in the first part, it was found that the smaller-scale carriers, which dominated a few airports, have a higher negative correlation overall between the route structure and the FFMS ratio. Therefore, isolating a single hub for further analysis can help to shed light on the system-wide findings.

To make a logical comparison, the selected airport must be a major airport in which all the big three carriers operate, but only one of them is dominant. The big three carriers can be compared with each other for market dominance based on the route structure parameters.

In this section, Miami International Airport (MIA) was selected. The selection criteria were based on the destination marketing population. As this research is related to using award tickets for leisure purposes, MIA Airport is a suitable destination because of its unique location in the US for holiday travel. The airports' close location to attractions in Florida makes them an internationally recognized travel point. Furthermore, MIA airport serves as a major hub for all cruise lines that depart for the Caribbean and The Bahamas region.

MIA is South Florida's main airport for long-haul international flights and a domestic hub for the Southeastern United States. MIA is the largest gateway between the United States and south to Latin America and is one of the largest airline hubs in the United States owing to its proximity to tourist attractions, local economic growth, large local Latin American and European populations, and strategic location to handle connecting traffic between North America, Latin America, and Europe.

Regarding Statista (2019), in 2018, MIA ranked as the 13th busiest airport in the United States and 40th busiest in the world by total passenger traffic. In the following year, MIA served its highest number of passengers in history and ranked as 3th busiest airport in the United States by international passenger traffic.

MIA is American Airlines' third-largest hub and serves as its primary gateway to Latin America. The predominant carrier at MIA is American Airlines, which has direct flights to most major cities in America and several European cities as well. European, Latin American, and Caribbean carriers are also well represented at MIA. The airport has no nonstop service to Asia, Africa, or Oceania. However, the big three airlines' customers have a chance to travel everywhere from MIA airport via strategic alliance partnerships. The customers of American Airlines can transfer between British Airways and Qatar Airways; the customers of Delta Air Lines can transfer between Air France and KLM; and the customers of United Airlines can transfer between Turkish Airlines and Lufthansa flights within the airport. So, the big three carriers' customers can reach their global destinations with award tickets via strategic alliances.

The detailed statistics for the big three carriers' operations in MIA are given in Section 6.3.1.

6.3.1 Summary Statistics for MIA

6.3.1.1 American Airlines Statistics for MIA

Regarding the Sabre Intelligence Database (2020), American Airlines marketed 180 different route combinations originating from MIA to domestic US destinations and 254 different route combinations originating from MIA to International routes. Regarding the scope of this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 1,164, and for international routes was 1,736. Therefore, the total number of observations for American Airlines was 2,900. In Figure 6.13, the total passenger distribution of American Airlines was given for domestic airline routes for a total of 16 quarters, and in Figure 6.14, the passenger distribution of American Airlines was given for international airline routes for 16 quarters as well.

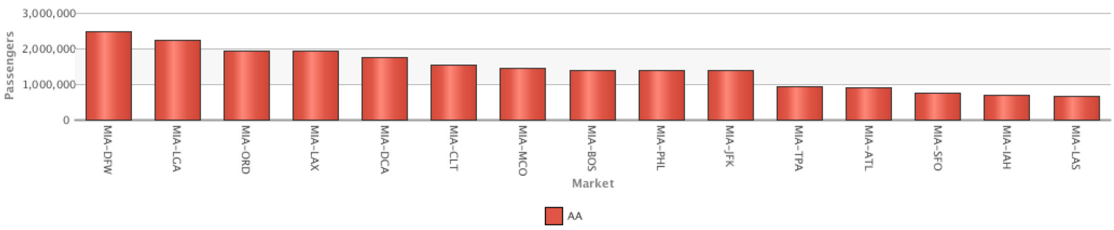


Figure 6.13 American Airlines Domestic Passenger Distribution on MIA 2016Q1 – 2019Q4

Source: Sabre Marketing Intelligence (2020)

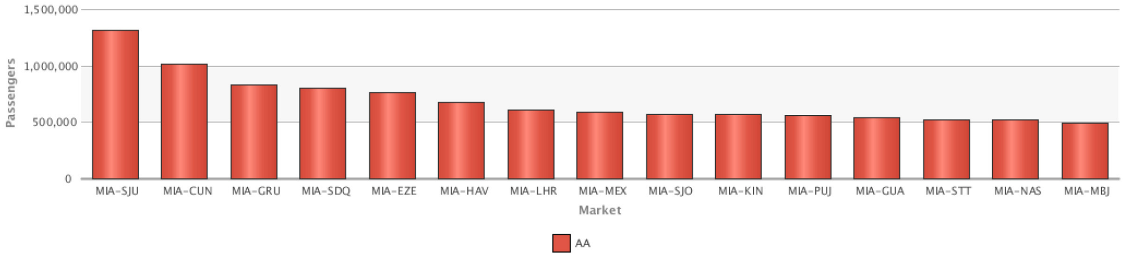


Figure 6.14 American Airlines International Passenger Distribution on MIA 2016Q1 – 2019Q4

Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on American Airlines data obtained from the Sabre Marketing Intelligence database are given in Table 6.18 as follows:

Table 6.18

American Airlines Descriptive Statistics for MIA

	Number of Observations	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	2,900	300.80	250.67	5.50	1,387.82	226.38
Credit Card Expenditure USD	2,900	26,510.07	30,000.00	12,500.00	40,000.00	10,697.07
Passengers	2,900	334,038.06	113,916.08	13	2,109,936	569,637.67
Airline Market Share %	2,900	46.29	50.17	0.01	98.61	31.10

6.3.1.2 Delta Air Lines Statistics for MIA

Regarding the Sabre Intelligence Database (2020), Delta Air Lines marketed 93 different route combinations originating from MIA to domestic US destinations and 44 different route combinations originating from MIA to International routes. Regarding the scope of this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 301, and 221 for international routes. Therefore, the total number of observations for Delta Air Lines was 522. In Figure 6.15, the total passenger distribution of Delta Air Lines was given for domestic airline routes for a total of 16 quarters, and in Figure 6.16, the passenger distribution of Delta Air Lines was given for international airline routes over the same time period.

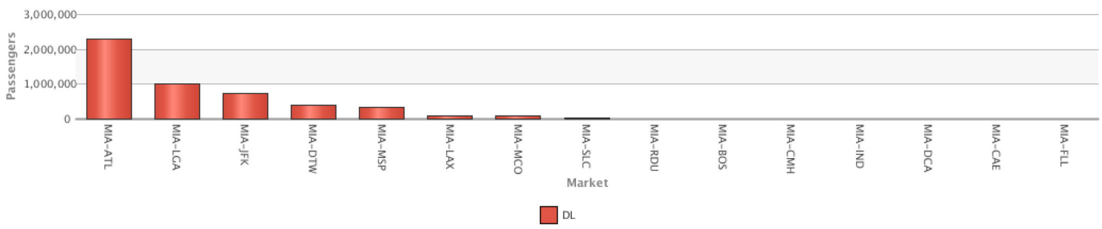


Figure 6.15 Delta Air Lines Domestic Passenger Distribution on MIA 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

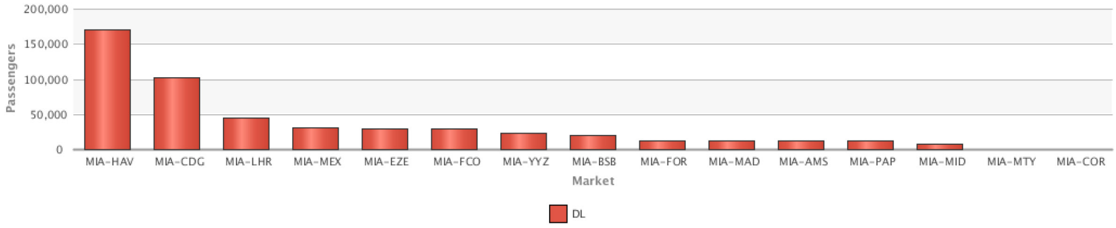


Figure 6.16 Delta Air Lines International Passenger Distribution on MIA 2016Q1 – 2019Q4

Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on Delta Air Lines data obtained from Sabre Marketing Intelligence database are given in Table 6.19 as follows:

Table 6.19

Delta Air Lines Descriptive Statistics for MIA

	Number of Observations	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	522	275.86	150.78	3.55	1,480.79	280.34
Credit Card Expenditure USD	522	24,791.21	35,000.00	17,000.00	60,000.00	9,884.35
Passengers	522	57,623.88	843,934.00	22	351,452	115,294.50
Airline Market Share %	522	3.28	1.54	0.01	13.84	4.35

6.3.1.3 United Airlines Statistics for MIA

Regarding the Sabre Intelligence Database (2020), United Airlines marketed 33 different route combinations originating from MIA to domestic US destinations and 40 different route combinations originating from MIA to International routes. Regarding the scope of this research, all international and domestic route combinations were observed for the quarterly period between the 2016 first quarter and the 2019 last quarter. The total number of observations for domestic routes was 112 and 270 for international routes. Therefore, the total number of observations for United Airlines was 382. In Figure 6.17, the total passenger distribution of United Airlines was given for domestic airline routes for a total of 16 quarters, and in Figure 6.18, the passenger distribution of United Airlines was given for international airline routes for 16 quarters period.

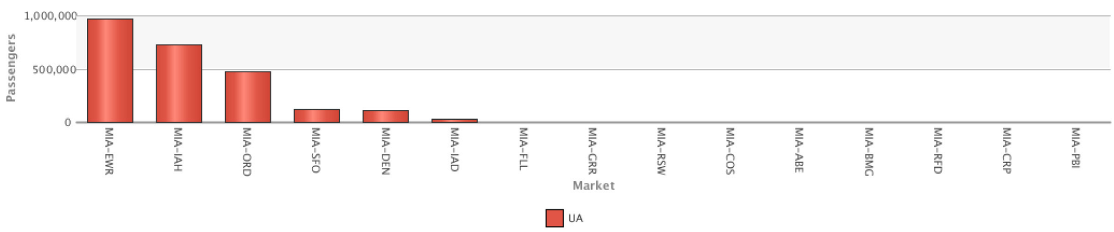


Figure 6.17 United Airlines Domestic Passenger Distribution on MIA 2016Q1 – 2019Q4
Source: Sabre Marketing Intelligence (2020)

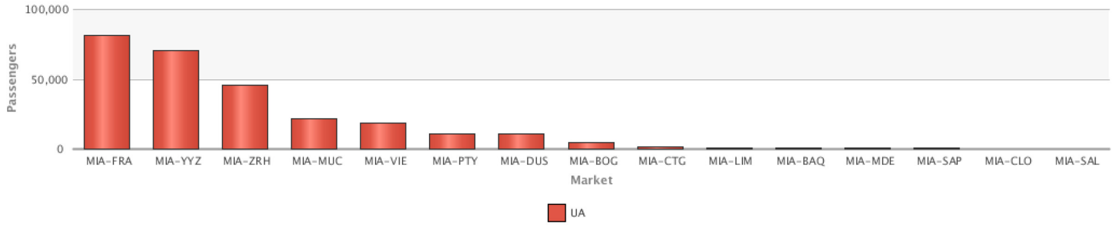


Figure 6.18 United Airlines International Passenger Distribution on MIA 2016Q1 – 2019Q4

Source: Sabre Marketing Intelligence (2020)

The summary statistics calculated in SMART PLS software based on United Airlines data obtained from the Sabre Marketing Intelligence database are given in Table 6.20 as follows:

Table 6.20

United Airlines Descriptive Statistics for MIA

	Number of Observations	Mean	Median	Min	Max	Standard Deviation
Base Fare USD	382	241.83	200.91	13.45	706.47	140.36
Credit Card Expenditure USD	382	14,670.33	11,666.67	8,333.33	28,333.33	6,142.44
Passengers	382	27,671.73	1,371.36	21	184,740	56,110.60
Airline Market Share %	382	2.68	1.11	0.01	37.01	5.00

Regarding the statistics obtained here, American Airlines has the most extensive route connection capacity. However, Delta and United Airlines' domestic route capacities were limited; they have a connection possibility to 40 different major global hub destinations on international traffic via their strategic alliance partnerships. As both of these carriers have a limited market share against American Airlines, MIA airport was a reliable source for research verification. The results of the verification SEM researches are given in Sections 6.3.2 to Section 6.3.4.

6.3.2 American Airlines SEM Results for MIA

The structural equation model results are given in Figure 6.19 as follows:

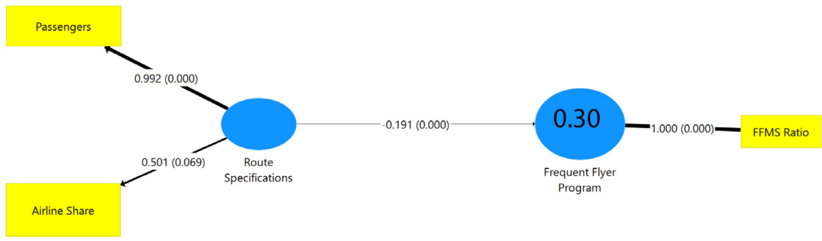


Figure 6.19 American Airlines SEM Results for MIA with P statistical values

Regarding this SEM modeling, all the observed coefficients were significant at the 95% level. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 30% of the observed variables in the research. Detailed statistical analysis of American Airlines SEM modeling results is given in Tables 6.21, 6.22, and 6.23 as follows:

Table 6.21

American Airlines SEM Model for MIA Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.755	0.739	0.745	0.617

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.22

American Airlines SEM Model for MIA Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	-0.191
Passengers	-0.199	0.992
Airline Share	-0.030	0.501

Table 6.23

American Airlines SEM Model for MIA Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.191	0.786
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.184	

Regarding the statistical calculations made in Table 6.21 for American Airlines SEM modeling, the Cronbach's Alpha coefficients exceed 0.7. So, it can be said that the model is valid according to the coefficients obtained from validity section.

According to the SEM results obtained in Table 6.23, discriminant validity was achieved for the model based on the Fornell–Larcker criteria and the Heterotrait Monotrait Ratio (HTMT) results.

Based on the SEM model outputs, the route specifications and the FFMS ratio have a negative correlation in MIA at 20% level. The correlation in MIA airport exceeds that of the entire route network because the MIA airport is the largest hub of American Airlines for the Latin American market.

Based on the summary statistics obtained for American Airlines in MIA, the airline has a clear advantage over its competitors via its extensive network capacity. The airline can offer various domestic and international connection possibilities to customers greater than Delta and United Airlines flights. So, American Airlines has a clear marketing advantage in this airport for the pricing strategy.

The path coefficient of American Airlines for MIA airport has a higher negative correlation than the entire airline network. Regarding the negativity in the path coefficient, the negativity obtained in the previous section was verified for American Airlines. The higher negativity obtained for a single hub may be related to demand theory. But in order to make an inference regarding the correlation among FFMS ratio and Hub operations, further research is needed.

6.3.3 Delta Air Lines SEM Results for MIA

The structural equation model results are given in Figure 6.20 as follows:

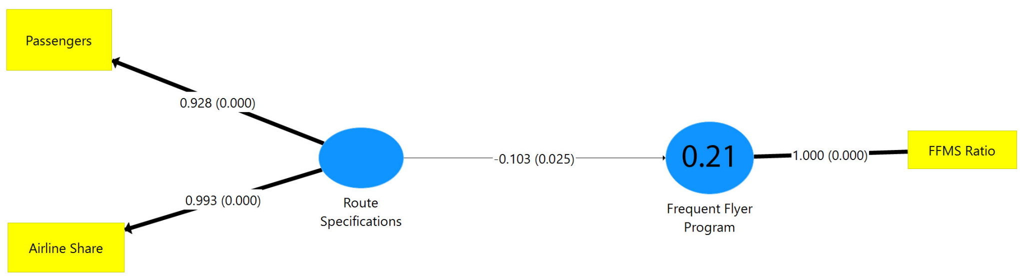


Figure 6.20 Delta Air Lines SEM Results for MIA with P statistical values

Regarding this SEM modeling, all the observed coefficients were significant at 95% ratio. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 21% of the observed variables in the research. Detailed statistical analysis of Delta Air Lines SEM modeling results are given in Tables 6.24, 6.25, and 6.26 as follows:

Table 6.24

Delta Air Lines SEM Model for MIA Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.934	0.995	0.960	0.923

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.25

Delta Air Lines SEM Model for MIA Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	-0.103
Passengers	-0.039	0.928
Airline Share	-0.120	0.993

Table 6.26

Delta Air Lines SEM Model for MIA Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.103	0.961
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.085	

Regarding the statistical calculations made in Table 6.24 for Delta Air Lines SEM modeling, the Cronbach's Alpha coefficients exceed 0.7. So, it can be said that the model is valid according to the coefficients obtained from validity section.

According to the SEM results obtained in Table 6.23, discriminant validity was achieved for the model based on Fornell–Larcker criteria and the Heterotrait Monotrait Ratio (HTMT) results.

Based on the SEM model outputs, the route specifications and the FFMS ratio negatively correlate in MIA at a 10% level for Delta Air Lines. The negative association in MIA airport is lower than that of the entire route network because MIA airport is not a hub for Delta Air Lines, where the number of domestic and international destinations was limited compared to Delta's route network as a whole.

The selection of Delta Air Lines in MIA served another purpose also. American Airlines has a higher demand than average in MIA in contrast to Delta Air Lines, which has a lower demand than average. Therefore, the results obtained in Section 6.2 can be compared with a carrier that has less demand than its entire network in MIA. So, including Delta Air Lines in the research was essential to verify the study results.

Upon comparing the path coefficient with American Airline's MIA calculation, Delta Air Lines' coefficient exceeded that of American Airlines. As Delta Air Lines has a very limited demand compared to American Airlines in MIA, it is clear that the FFMS ratio was correlated with passenger demand negatively.

6.3.4 United Airlines SEM Results for MIA

The structural equation model results are given in Figure 6.21 as follows:

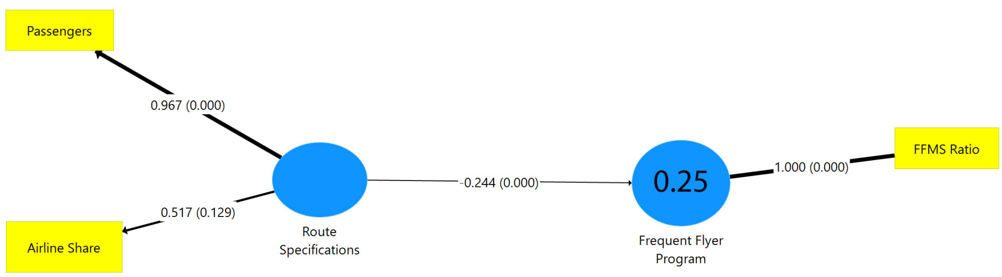


Figure 6.21 United Airlines SEM Results for MIA with P statistical values

Regarding this SEM modeling, all the observed coefficients out of the coefficient of Airline Share were significant at 95% ratio. According to the latent variables R square statistics of the Frequent Flyer Program, this SEM model helps explain 25% of the observed variables in the research. Detailed statistical analysis of United SEM modeling results is given in Tables 6.27, 6.28, and 6.29 as follows:

Table 6.27

United Airlines SEM Model for MIA Reliability and Validity Analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Route Specifications	0.440	0.895	0.734	0.601

*Note: Frequent Flyer Program is not included because it is measured as a single-item construct.

Table 6.28

United Airlines SEM Model for MIA Cross Loadings Analysis

	Frequent Flyer Program	Route Specifications
FFMS Ratio	1.000	-0.244
Passengers	-0.251	0.967
Airline Share	-0.075	0.517

Table 6.29

United Airlines SEM Model for MIA Fornell-Larcker and HTMT Analysis

Fornell - Larcker Criteria	Frequent Flyer Program	Route Specifications
Frequent Flyer Program	1.000	
Route Specifications	-0.244	0.775
HTMT Analysis	Frequent Flyer Program	Route Specifications
Frequent Flyer Program		
Route Specifications	0.307	

According to the SEM results obtained in Table 6.29, discriminant validity was achieved for the model. Regarding the statistical calculations made in Table 6.27 for United Airlines SEM modeling, the Cronbach's Alpha coefficients specifications are below 0.7. So, it can be said that the model is not valid according to the coefficients obtained from validity section. As no valid model can be established for United Airlines, it cannot be compared with other airlines in this part of the research.

Even if no valid model was found for the United Airlines, the remaining model results obtained in Section 6.2 have been verified in Section 6.3. So, it is determined that the airline route specifications were negatively correlated with FFMS ratio. Based on the path coefficients obtained in this part of the research for Delta and American Airlines, the valid models' results in Section 6.2 have been verified. It can be concluded that FFMS is negatively correlated with demand.

6.4 Reporting the Hypotheses

The reporting of Hypotheses 1 and 2 was based on calculations made in the FFMS simulation result in Section 6.1. The reporting of Hypothesis 3 was based on calculations made in Sections 6.2 and 6.3 of this research. Detailed analysis results based on each hypothesis for the calculated results are given separately for each hypothesis as follows:

Hypothesis 1: There is a significant difference in the FFMS ratio for each airline in this study.

According to calculations based on Section 6.1, the minimum FFMS ratio distribution was obtained for Hawaiian Airlines, whereas the maximum FFMS ratio distribution was calculated for United Airlines. The FFMS ratio calculated for United Airlines is approximately seven times higher than for Hawaiian Airlines, with a maximum ratio of 13.20%. Similar differences have been observed from other selected airlines' calculations. In Section 6.1.5, the different credit card FFMS return possibilities of the selected airlines were compared with the Expected Marginal FFMS Return (EMFR) approach. The methodology provides a credit card correlation matrix in which each of the selected credit cards was compared based on the maximum FFMS return and what percentage of the customers can get a higher FFMS ratio in the simulation. Based on the credit card correlation matrix, the order of the selected credit cards based on the possibility of earning higher miles can be given as follows:

United Mileage Plus Club > Delta American Express Sky Miles > AAdvantage > Alaska Airlines Visa Signature > Hawaiian World Elite Mastercard.

Based on the EMFR results, the correlation between the Hawaiian Airlines card and the United Airlines credit card was 33.09 (the maximum ratio in the correlation matrix). Additionally, the other coefficients are higher than one, based on the credit card ranking. If the correlation coefficient obtained in the EMFR matrix table exceeds 1, it represents that customers can obtain a significantly higher FFMS return possibility when they want to change their credit card program. So, significant differences exist in different credit card program FFMS returns for our selected carriers. Therefore, these research findings support the first hypothesis.

Hypothesis 2: The possibility of obtaining a higher FFMS ratio is significantly greater for the big three airlines.

According to calculations made in Section 6.1, it was found that the FFMS ratio distributions were lower for Hawaiian and Alaska Airlines compared to other major carriers (the big three airlines). Furthermore, the big three airlines' maximum FFMS returns were found to be multiple times higher than those of the smaller-scale airlines.

Additionally, based on the EMFR correlation matrix, if a passenger decides to change their credit card program from a smaller-scale airline to one of the big three airlines, the obtained coefficients exceed 1. Hence, they will have significantly greater FFMS returns. Therefore, based on these research findings, the second hypothesis is verified that the big three airline credit card programs offer higher FFMS returns.

Hypothesis 3: The route specifications are negatively related to the frequent flyer program specification of the airline.

Based on the SEM results obtained in Section 6.2, all valid models' correlations were found negative. It was inferred that the negativity obtained in these models was strongly related to the demand for the routes that are marketed by the selected carriers. Regarding demand theory, as the passenger numbers and market share of a selected airline increase, the ticket price decreases. Therefore, the correlation between passenger numbers and ticket price was considered negative. Hence, it is expected that negative coefficients will be observed in all valid models because ticket price is the main variable of the FFMS ratio. So, an increase in the demand lowers the FFMS returns.

To verify the findings in Section 6.2, another study was conducted on MIA. Regarding the verification study, American Airlines operates a large hub in MIA. Therefore, the demand for American Airlines route is greater than the average of the entire network. The path coefficient obtained for American Airlines in MIA is -0.191 whereas the coefficient for entire network is -0.169. However, the Delta Air Lines' path coefficient for MIA is -0.103 whereas the entire network path coefficient is -0.188. Therefore, the negative relation between the route specifications and the frequent flyer program was reinforced both in Sections 6.2 and 6.3. It can be inferred that the FFMS ratio is negatively correlated with the demand for a particular flight route for our selected carriers. Furthermore, based on the numbers obtained in the verification study, it can be inferred that the market share in a hub airport also has a negative effect on the FFMS ratio. But in order to verify this inference further research is needed in different major hub airports.

CHAPTER VII
Conclusion

This dissertation studies the essentials of airline loyalty programs in the airline industry. With this level of relevancy, it can be somewhat puzzling to see how little interest the airline loyalty programs are afforded in some airlines, at least due to the limited interest in airline loyalty programs in annual reports and investor presentations. In many cases, the airline loyalty programs' literature is limited to the accounting standard for current mile liability, discussing the method, and the total amount of deferred revenue. This limited attention may not reflect senior management's focus and dedication to airline loyalty programs. However, it does increase the question of whether the airline loyalty programs are genuinely recognized for the contribution they bring to the airline industry.

Nowadays, airline loyalty programs operate as a section of a complex ecosystem of interlinked company relationships. In greater ways than one, airline loyalty programs' survival hinges on their potential to forge profitable partnerships outside the airline. However, the programs have arguably been equally profitable in developing partnerships outside the traditional airline environment and delivering lasting and successful partnerships. This kind of partnership is centered around the direct accrual of miles on non-air partners such as hotels, rental car agencies, and airline co-branded credit card partnerships. This dissertation focuses on returns of airline co-branded credit card programs for customers. To enlighten the importance of frequent flyer programs, this dissertation offers a comparison methodology for airline co-branded credit card programs that enables both customers and airline top management to compare different returns in their loyalty programs.

In the second chapter of this dissertation, the importance of airline loyalty programs was discussed by comparing different airline loyalty programs regarding their co-branded credit cards. According to the literature review section, limited research has been conducted regarding the importance of airline co-branded credit cards based on their mileage revenue via quantitative analysis. This dissertation's significant contribution to the literature is that the FFMS ratio of different airlines was compared via simulation methodology, which is a beneficial technique to simulate passenger demand within the selected airline networks globally.

Regarding FFMS simulation distributions, smaller-scale airlines were found to have lower FFMS distributions with average 1% returns. In contrast, the big three airlines have higher distributions with a maximum FFMS ratio of 13.20% for United Airlines. After obtaining the simulation outputs, the airline co-branded credit cards that required less credit card expenditure to fly with free award seats were compared via the EMFR methodology. This methodology investigates the correlation among the selected credit card distributions by multiplying the chance of obtaining a higher FFMS ratio and the difference between Maximum FFMS ratios of selected carriers in the simulation outputs. Regarding the EMFR correlations, the order of credit card programs based on their returns to customers is given as follows:

United Mileage Plus Club > Delta American Express Sky Miles > AAdvantage > Alaska Airlines Visa Signature > Hawaiian World Elite Mastercard

According to the results obtained in Chapter 6.1, for the airlines that operate a higher number of intercontinental routes (the big three carriers), their FFMS ratio distributions were higher than smaller-scale airlines. This finding is highly correlated with the ticket price strategy of the airlines. The big three airlines are marketing a vast number of international routes via their membership in strategic alliances. Therefore, as the route variations in the international routes increase, it causes increased ticket prices and increases the FFMS ratios. Therefore, it explains the finding in the simulation why the big three airlines have higher FFMS ratios than the smaller-scale airlines.

Regarding the SEM calculations made in Chapter 6.2, the correlation among route structure and frequent flyer program specifications (FFMS ratio) were found to be negative in each valid model. Only the correlation between the airline share and FFMS ratio was found to be positive for Hawaiian Airlines. This finding is related to the monopolistic market of Hawaiian Airlines.

Based on the valid SEM calculations, the path coefficient among all valid models was found negative. The negativity was strongly related to the demand for the routes that are marketed by the selected carriers. Regarding demand theory, as the passengers' number and market share of a selected airline increase, the ticket price decreases. Therefore, the correlation of passengers' number and ticket price was considered negative. Thus, it can be inferred that an increase in demand lowers FFMS returns.

In Section 6.3, the results obtained in the SEM model for all selected airlines were controlled within a selected hub airport. As no previous SEM methodology was used to quantitatively analyze the outcomes of frequent flyer programs, verification of the model results was necessary in the research. Therefore, MIA was selected to conduct the verification study.

Upon comparing the path coefficient with American Airline's MIA calculation, Delta Air Lines' coefficient exceeded that of American Airlines. As Delta Air Lines has a more limited demand than American Airlines in MIA, it is demonstrated that the FFMS ratio was highly correlated with passenger demand in an airport hub negatively. But in order to verify this finding, further research is needed to analyze other major airport hubs.

Based on airline commercials, airlines tend to attract customers (especially those who reside near their major hubs), promising them to earn higher amounts of air miles when they become members of their airline co-branded credit card program. Based on the literature, even if airlines offer different reward miles to their customers, the monetary value of these award miles significantly differs from each other, and passengers are not well informed about this situation. One of the contributions of this research in the market is that, based on the SEM model results obtained in Sections 6.2 and 6.3, passengers do not need to invest in just the dominant carrier in their home airport bases. They may be able to earn higher FFMS returns by investing in another carrier co-branded credit card program with a limited market share.

According to this dissertation's findings, the most crucial aspect was that each of the selected airlines has a chance to offer a significantly higher amount of returns to their co-branded credit card users. To offer an effective savings ratio, the airlines need to use a balanced chart where the ticket prices can be adjusted based on the customer demand. Co-branded credit card programs offer airlines a way to generate cash revenue even if they can not operate during the times of crisis. During the Covid-19 crisis, revenue from any source becomes crucial to pay for daily expenses for airlines. The co-branded credit cards offer continuous cash flow to the airlines. Therefore increasing the passenger portfolio for airline co-branded credit cards, increases the stable financial income of the airlines.

Airline loyalty programs have been used by airlines for more than 40 years now. Airline loyalty programs have managed to carve out a unique role in the airline industry. A position that is both on the outside of the airline and touching the core delivery of the airline product. It is in the hands of program proprietors and operators to chart the high-quality direction going forward. It is clear, however, that in the future, programs will be held to growing standards from members regarding their value in addition to partners and the airways that will count on an even increased return from the airline loyalty programs. Meeting those standards will require constant innovation and dedication to developing and evolving the programs.

CHAPTER VIII

Limitation of The Research and Further Study Recommendations

In the scope of this dissertation, passengers are considered to earn frequent flyer miles just from airline co-branded credit cards and redeem them on award flight tickets only. All other mileage earnings and redemption options were not considered in this study. In reality, passengers can earn multiple rewards when they spend on restaurants, hotels, air tickets.

One important limitation of this study is that only the static award charts obtained from the airlines were used during the study. As there is no scientific database that provides airline data along with mileage data, only the static award mile charts offered by the selected airlines could be used. Based on the static award charts, a linear relationship can be seen among ticket prices and award mileage requirements. In order to issue an award ticket in expensive routes, the passengers are asked to redeem more miles. But this relation is different for each of our selected airlines which causes significant different FFMS returns for different airlines. Furthermore, Delta Air Lines was the first airline among big three carriers that started using dynamic award charts based on their dynamic pricing strategy. In the close future, the other airlines are expected to use dynamic award charts while issuing award tickets or upgrades as well. So, analyzing the effect of dynamic award chart on the FFMS ratio is another future research possibility.

Another limitation is that if the airlines can provide more data for their frequent flyer program, such as how many seats are used by an award ticket with time series, it will provide a deeper understanding of the SEM model. This dissertation's selected airlines did not share their company data for frequent flyer programs for privacy issues. To run the model, the dataset was generated in a unique script coding sequence. Therefore, the mileage data were not the airline's actual results, but they represent a close estimation of the actual airline mileage data. Furthermore, no previous SEM research was conducted on comparing the savings ratio of co-branded frequent flyer credit card awards in the literature. Thus, the SEM model used in this dissertation can be considered an exploratory model. To check the validity of this model, further research is needed to investigate its effect on different geographic regions.

The findings of this dissertation encompass system-wide simulations and are based on averages to determine FFMS values; hence, the findings cannot advise consumers based on individual circumstances. Regarding the individual customers' perspectives, the customers may not prefer to fly with another carrier, or they do not want to change their credit cards in order to fly on a specific flight route. Furthermore, as all of the examined credit cards requires an annual payment, using another airline credit card may not be financially reasonable for some customers. Therefore, this study mainly offers a comparison methodology for customers. If they prefer, they have a different credit card options which they can save up to 13.20% percent of their credit card expenditures for an airline ticket. Additionally, passengers are still able to earn additional status miles when they fly with paid ticket and additional bonus miles from other partners.

One extension of this research will be to analyze all flag carrier commercial aviation companies under strategic airline alliances that also promote their official credit cards in different geographical regions, such as European, Chinese, and Middle Eastern regions. This will allow for the comparison of all the frequent flyer programs simultaneously. Such a comparison could help airlines redesign their loyalty program specifications so that passengers can collect and redeem their frequent flyer miles more easily. If airlines want to increase passenger demand and loyalty, they need to increase their overall service quality, and if they successfully adopt this strategy, it could boost business volume for the aviation industry significantly.

Additionally, the FFMS analysis tool can be used to analyze the loyalty programs of international cruise ship companies. The cabin marketing and pricing strategies of cruise ships are like aviation seat marketing, and most cruise companies are already promoting their official credit cards, making it possible to compare the specifications of cruise ship loyalty programs using FFMS analysis and SEM modeling. The most important factor regarding the cruise ship sector is that the data is extremely limited, and most of the cruise ship companies are registered in regions where the declaration of their financials is limited.

Lastly, more survey-based research can be conducted in the future in order to better understand what consumers value related to frequent flyer programs, including the most preferred redemption options beyond an award flight ticket.

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APPENDIX

Table A1

Historical Evaluation of U.S .-Based Airline Loyalty Programs

Year	Event
1980	Western Airlines began giving discount checks to passengers who flew a certain number of flight legs.
1981	American Airlines, Delta Air Lines, and United Airlines implemented their frequent flyer programs.
1982	American Airlines implemented their Gold tier status, which provides additional benefits. Also, American Airlines entered into a partnership agreement with Hertz car rentals and Holland America Lines.
1983	Alaska Airlines implemented their Gold Coast travel program.
1985	Diners Club issued the first credit card tied with a loyalty program. The program was called Club Rewards.
1986	The first U.S.-based frequent flyer alliance was announced between the Pan Am World Pass and American Airlines AAdvantage programs.
1987	Southwest Airlines introduced their Company Club program, which was based on the segments, rather than miles, flown.
1988	United Airlines and American Airlines announced discounted mile tickets that allowed customers to redeem a reduced number of miles for a certain restricted number of seats.
1989	United Airlines added an expiration date for customer frequent flyer miles. Alaska Airlines renamed its program to Mileage Plan.
1991	The bankruptcy of Midway Airlines caused 700,000 members to lose their frequent flyer miles. American Express launched its first Membership Miles program.
1992	United Airlines began charging a fee for making changes to award tickets.
1995	Delta Air Lines renamed its program to Delta SkyMiles.
1996	Southwest Airlines changed its frequent flyer program name to Rapid Rewards.
1997	United Airlines and Lufthansa Airlines launched the first global airline alliance, called the Star Alliance. The U.S. government started charging 7.5 % tax on the sale of airline miles.
1999	American Airlines signed partnership agreements with mortgage broker companies.
2002	The Internal Revenue Service (IRS) issued a formal policy stating that business travelers did not need to pay taxes on their earned frequent flyer miles.
2005	The *Economist* suggested that the total stock of unredeemed frequent flyer miles was worth more than all of the dollar bills circulating around the globe (Economist, 2005).
2007	Virgin America Airlines launched the Elevate program, which is a revenue-based mileage accrual system.
2008	The new accounting standard called the International Financial Reporting Interpretations Committee Standard 13 (IFRIC 13), is released, regarding the standardization of accounting methods for airline loyalty programs.
2009	Jet Blue made major changes in their program to allow passengers to earn frequent flyer miles based on ticket price, ticketing channel, and type of payment method.

Year	Event
2011	Delta Air Lines decided to eliminate its mileage expiration limit. Southwest Airlines changed its reward model to a revenue-based model.
2015	Delta Air Lines introduced revenue-based mileage accrual, in which current members can earn up to 11 miles per U.S. dollar spent on ticket purchases on Delta or partner airlines.
2019	United Airlines cancelled their mileage expiration policy

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