Article

Airline Passengers’ Willingness to Reserve Inflight Meals Online and Their Willingness to Pay for Meal Upgrades: The Case Study of U.S. Students

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Abstract: While the cabin waste of an aircraft has been recognized and criticized, there is not enough research that explores its gravity in airlines and ways to reduce its total amount. This research aimed to highlight the importance of promoting online meal reservations for airline passengers as a way to minimize food waste and for airlines to offset the cost of tailoring inflight food options by revealing the inflight meal types and subcategories for which passengers are willing to pay an upgrade fee to support environmental and economic sustainability. A sample of 192 students from higher education in the U.S. completed an online questionnaire survey. Two groups with distinctive preferences for inflight meal upgrades were identified using exploratory factor analysis and cluster analysis. Participants were more likely to reserve inflight meals online when various inflight meal options were provided. They presented a higher willingness to pay more when a variety of foods was provided, with a lower willingness for healthy or religious foods. The highly educated participants in a younger age group and Asian/Pacific Islanders presented a significantly higher willingness to reserve meals online than the rest. The study results highlight the potential benefits of offering an online reservation option for inflight meals to reduce cabin waste and ensure passenger satisfaction.

Keywords: airline; inflight meal; willingness to pay; willingness to reserve online; cabin waste

1. Introduction

The airline industry is characterized as an aggressive and challenging business [1]. Airlines in a highly competitive service industry must continuously develop distinguishing products and services to gratify and conserve passengers. Regardless of full-service (vs. low-cost) carriers or international (vs. domestic) airlines, the fundamental aim for an airline is to achieve a higher market share of airline passengers. While it is evident that airlines should incorporate innovativeness into their operation [2], it is a constant struggle to identify the elements desired and appreciated by the passengers, as it often results in significant costs for an airline without evident performance. Mills and Clay [3] noted the potential of using inflight foods to build loyalty. Additionally, it is vital for businesses to practice environmentally sustainable activities, as consumers appreciate businesses that choose to be involved in such activities [4]. The importance of sustainability has been highlighted over the years for various industries. It is crucial for businesses to employ environmentally sustainable practices as they are essential components in building social responsibility and a green image. Every company that targets waste management is recommended to reuse unused items [5]. They have noted the importance of designing value chains sustainably so that their customers would consider the company’s effort to minimize the destruction of the environment positively rather than merely as a way to expand its sales. Applying similar logic, the airline industry should evaluate its current
status concerning sustainability and explore various approaches to embed environmentally sustainable practices. Hagmann et al. [6] noted that companies must reflect green trends when designing products or services to build social responsibility. However, the airline industry is the largest obstructive factor in forming sustainable tourism due to the amount of greenhouse gas released [7], and it is one of the significant contributors to global warming [8]. Additionally, airline businesses are ill reputed for their ineffectiveness in using resources to maximize their services and productivity [9]. More importantly, the aviation industry has been criticized for not constructing a consistent and universal approach to practicing sustainability [8]. Thus, it is a fundamental step for aviation to employ sustainable practices with less impact on climate change [10].

Corporate social responsibility is a professional strategy for airlines to construct sustainability [1]. Kim et al. [11] classified corporate social responsibility into required, legally enforced, and desired environmental or humanitarian practices. They found that passengers became highly loyal to the airlines that practice voluntary environmental sustainability but not to those that implement regulatory and corporate social responsibilities. When airlines properly define and report sustainable practices, their genuine commitment to sustainability is expected to earn credit rather than be seen as merely an advertising message [8]. For instance, passengers presented high loyalty to the airlines that were perceived to be practicing environmental or philanthropic responsibility but not to those practicing legal or required responsibilities [11]. Additionally, major air carriers with wide-ranging public exposure and a high profit margin are expected to benefit from active engagement in environmentally sustainable and socially responsible practices [12]. According to Dow Jones Sustainability Indices, Western airlines scored substantially higher in corporate social responsibility than Asia Pacific Airlines [1]. However, the most frequent sustainable practice utilized and researched in the aviation industry involves reducing carbon emissions [13]. Utilizing the Markov decision process model, Goto et al. [14] noted the importance of developing optimal policies for inflight meal provisioning: production and alteration stages. They found that the optimal meal policies in long-haul flights may result in significant cost savings, approximately 20%, as it prevents excessive food from being prepped and loaded onto an aircraft and promotes better customer service. This highlights the importance of airlines carefully selecting the meal options that the passengers will enjoy without resulting in more waste.

The amount of food waste from unused and unconsumed products in the aircraft is huge, affecting the size of carbon footprints [15]. Managing food waste in business operations is an important social issue that hospitality industry firms must consider [16]. They emphasized that food waste reduction may be a successful strategy for hospitality managers to use to build a higher profit and positive company image and preserve natural resources. Although cabin waste, including food waste from an aircraft, has a major impact on gas emissions, it has been generally overlooked. Cabin waste from an airplane can be traced to two dominant categories: cleaning and catering [15]. By weight, approximately 60% of the cabin waste was generated from catering, while about 70% of catering waste accounted for surplus food and drink. This may highlight the importance of meal provisioning to identify the inflight catering items that passengers would appreciate and to reduce the leftover food and drinks. While this highlights the abundance of cabin waste, it also emphasizes the potential benefits of carefully selecting the most desirable meals for passengers and allocating adequate food for the aircraft. Thamagasorn and Pharino [9] stated that airlines might save considerable costs by creating menus and recipes for efficient resource use and communicating the advantages of shrinking food waste. Abbas and El Gamal [17] noted that studies examining the influence of onboard food service on passengers’ travel experience are necessary. Additionally, the passengers’ satisfaction with the airline meals was influenced by the type of foods served onboard and how they are perceived [18]. You et al. [18] noted the importance of considering airline cabin waste earnestly and employing social norms to change passengers’ food waste behaviors.
Airline research regarding sustainability frequently discusses the importance of lowering carbon footprint by reducing flight distance but often overlooks the gravity of food waste. Therefore, the current study focused on revealing feasible areas to incorporate sustainability in the airline industry by suggesting online meal reservations to reduce the total cabin waste, including food waste. While the three pillars in sustainability are primarily discussed [19], the current study mainly focused on environmental and economic sustainability. For example, passengers’ readiness for online meal reservations was explored in order to reduce cabin waste, including food, with the goal of lessening the aviation industry’s carbon footprint. While implicating innovative arrangements often results in notable costs, adding an online reservation meal option and promoting its advantages will result in a relatively lower cost for airlines to apply, representing economic sustainability.

The primary study’s purpose was to examine passengers’ likelihood of choosing inflight meal upgrades, if available, instead of a typical meal, and determine the range of dollars passengers are willing to pay for the assorted upgrade options. By identifying the inflight meal components (e.g., protein, vegetables, starch, dessert, beverage) that passengers would appreciate, airlines may gradually implement such components rather than build a brand-new meal. The research attempted to reveal the proportion of passengers willing to reserve meals online if provided. For the current research, the earliest time is when the passengers select their seats. This may enable airlines to plan and load the meals promptly and offer the type their passengers prefer. While many airlines recognize the importance and necessity of providing environmentally friendly services [20], airlines need to work on revealing the potential and practical areas for effective environmentally friendly practices. The current research suggests alternative ways for letting passengers self-select their inflight meals to enhance their satisfaction and lower overall food costs by reducing surplus menu items. Elliott [21] implied that allowing airline passengers to pick their inflight food may improve service and quality perceptions. From the research findings, the airline industry may better comprehend how international travelers perceive inflight meals. By examining the passengers’ willingness to reserve inflight meals online, the study may reveal the passengers’ readiness for online reservations and the feasibility of systematically allocating meals to accommodate the passengers’ food liking. This will highlight the importance and potential benefit of systematic inflight meal provision. For airline sustainability, the research result may highlight the possibility of reducing cabin waste, especially surplus foods, by enabling passengers to indicate their meal selections as early as possible.

2. Literature Review
2.1. The History of Inflight Food Service

The initial inflight food service dates back to 1919 when pre-packaged lunch was served on a Handley Page flight, as displayed in Table 1. Since then, airline companies have focused on constructing efficient and innovative ways to design inflight food services [22,23]. They improved the quality of catering onboard to satisfy passengers’ service needs. When low-cost carriers arose around the 1980s, many airlines pitched toward reducing complimentary inflight food services. Since 2003, passengers have had to pay an extra fee for food or drinks onboard [24]. While low-cost carriers focus on minimizing inflight food service, a high level of service is still necessary for international flights, even for economy traveling class. The extensive number of passengers indicated that they still predominantly fly with traditional airlines [25].
Table 1. History of inflight food service.

<table>
<thead>
<tr>
<th>Year</th>
<th>Airline</th>
<th>Meals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919</td>
<td>Handley Page</td>
<td>Pre-packaged lunch</td>
</tr>
<tr>
<td>1927</td>
<td>Air Union</td>
<td>Full meal service</td>
</tr>
<tr>
<td>1928</td>
<td>Lufthansa</td>
<td>Full hot food service</td>
</tr>
<tr>
<td>1934</td>
<td>United Airlines</td>
<td>Inflight kitchen service</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950~</td>
<td>Golden age</td>
<td>Tablecloths and silver service, high-quality cuisine</td>
</tr>
<tr>
<td>1970~</td>
<td>Popularized and differentiated</td>
<td>Buffet service for the upper class and cabin lounge</td>
</tr>
<tr>
<td>1980~</td>
<td>Low-Cost Carriers generation</td>
<td>Focused on reducing catering cost</td>
</tr>
<tr>
<td>2011~</td>
<td>Specialized</td>
<td>Onboard chef (e.g., British Airways, Singapore Airlines)</td>
</tr>
<tr>
<td>2013~</td>
<td>Personalized</td>
<td>Introduction of a new food ordering system</td>
</tr>
<tr>
<td>2020~</td>
<td>More personalized with a la carte options</td>
<td>The higher appearance of culture and local selection in meals using advanced technology</td>
</tr>
<tr>
<td>2021~</td>
<td>Provisioned for a brand image</td>
<td>Meal with minimal packaging, modern menu items, recycling, and reducing food waste</td>
</tr>
</tbody>
</table>

Source: [22,23,26,27].

Inflight catering is a fundamental attribute contributing to airline service quality and passengers’ overall experience and satisfaction [28,29]. While the rise in fuel prices and the cost of food waste are major challenges for airlines, airline companies are determined to improve the quality, quantity, and type of inflight food. King [28] noted that airlines should explore superior ways to decide the number of inflight meals and allocate them properly. If not, airlines must bear all the expenses of unexploited foods contributing to higher food costs. The hospitality industry lacks a standard for quantifying or reducing food waste and even fewer ways for corporate business professionals to practice hospitality [16]. Additionally, they regularly deal with the highly fluctuating food production schedule due to last-minute changes to the passenger counts. Most airlines serve their inflight food “as is” based on its availability. This approach may result in unsatisfied passengers, especially economy passengers who have no choice but to eat whatever is available if the other option runs out.

Conceptually, “inflight meal upgrade” in the study refers to adding something extra to the existing meal offerings that passengers perceive as valuable or making changes to the current offerings that they may be willing to pay a premium price [30,31]. Additionally, inflight meal upgrades operationally may represent dividing the bundled meal into subgroups of various components (e.g., starch, protein, vegetables) or offering itemized descriptions for meal options. Examples of detailed descriptions may include exhibiting the use of ingredients, the total calorie or fat amount, or adding recognizable labels or brands for inflight meals.

2.2. Innovativeness and Inflight Food Service

Product or service innovation is an essential element for numerous industries to consider for the economic growth of their businesses [2]. There are various ways to implicate innovativeness in the hospitality and tourism industry, including airlines. One of the evident technological innovations includes mobile devices’ emergence in booking a flight [32]. Mobile technology in the aviation industry for reserving a flight has progressed significantly and was found to enhance productivity and airline service qualities and cut operation expenses [33]. In relation to environmental sustainability, innovative attempts in the political aspects of tourism may include implicating taxes for air transportation based on its travel length and gas emissions [7]. Thamagasorn and Pharino [9] presented several suggestions to lessen vegetable waste, such as technology investment to select and control quality ingredients and additional employee training.
However, it is essential to note that the connection between innovativeness and profitability is somewhat weak [2]. Thus, it is essential to examine prospective products’ potential needs and value when revamping any product or service. Airline professionals should consider passenger perceptions when designing innovativeness [34]. Similarly, in planning products or services focusing on sustainability, companies must consider consumers’ concerns and preferences for environmental friendliness [5]. Hwang and Choi [20] found that environmental activists committed to motivating the public to sustain the environment may forsake long-haul flights and choose travel destinations with proximity to minimize the negative influence based on samples of airline travelers in Korea. They also noted that airline passengers care about the extent of environmentally sustainable practices implemented by the airlines, leading to positive behavioral intentions. It is essential to identify the options that the passengers will like. This is because passengers’ perception of airline food attributes influences their meal consumption behavior and determines the amount of food waste generation [18]. Similarly, when designing inflight meals, it is important to consider what meal type would be appreciated by the passengers. The type of meal also differs based on the flight schedule, which governs the waste amount and contents [35].

Businesses can achieve uniqueness by developing innovative products or services using technology. It is crucial for airlines to develop their distinctive identities as their positive influence on the attitudes of U.S. first-class travelers [36]. Consequently, the passengers value first-class flights highly, are strongly attached, and pay higher prices for their uniqueness. Compared to leisure travelers in the U.S. market, business travelers were exceedingly willing to travel using an aircraft and pay more for enhanced service elements [37]. However, there is not enough research to address environmentally sustainable practices in designing the product and whether it influences airline passengers [6]. Airlines should constantly assess whether passengers would appreciate such added values. There are two primary elements that need to be considered before determining the proper strategy. They include affordability in personalization and productivity in mass production [38]. The mass customization of airline meals addressing customers’ individually selected options for international flights can be a distinctive marketing strategy, especially for major airlines [39]. According to [40], well-designed inflight food service highly correlates with overall service quality and satisfaction for business and economy-class travelers. These airline passengers presented the highest perceived value for onboard meal service [41]. The research proposes an innovative approach by utilizing inflight meals and online reservations to promote sustainability and corporate social responsibility. The study assumed that the customer-desired alterations in existing inflight meal service might be an example of an innovative and unique approach that could build business competitiveness. To adequately prioritize the innovation of existing products, business marketers must reflect their capability [5]. The disorderly inflight meal distribution directly influenced food waste and reinforced unsustainable consumption and production for airline catering [9]. Klisinar and Widjaja [42] found that the passengers appreciated when the products were offered as a la carte (e.g., additional baggage, seat selection, seat upgrades) instead of as a bundle. Onboard food attributes (e.g., taste, variety, quality) satisfied passengers and even contributed to their loyalty toward the airlines that offer values [17]. Therefore, the current research divided the meal into subcategories (e.g., protein, dessert) and possible meal upgrade options to investigate the passengers’ willingness to pay and reserve online.

2.3. Benefits of Online Reservation, Willingness to Pay, and Willingness to Reserve Online

Two principal flight ticket purchasing modes include manual and electronic reservations [33]. Compared to offline reservation methods, the online booking system is more expedient and proficient [43]. According to the research that investigated the service attributes, online boarding using a smart device was a top-ranked feature with a critical influence on passengers’ satisfaction [44]. The results also pointed out the importance of providing tools to passengers to expedite the transaction to reduce the wait times for
faster service with enhanced convenience. Leisure travelers who booked flights through online channels were highly focused on low prices and not devoted to airline brands [37]. Web-based booking systems of North American airlines offered travelers complete services and favorable website attributes compared to airlines from other regions such as Europe, the Middle East, Asia, and Australia [45]. Similar to the cost reduction of reserving flights online [46], the potential use of online platforms to indicate passengers’ selection of ancillary services could be noteworthy.

When the majority of the passengers select and reserve their favorable foods using the online system, there are several advantages that airlines may expect. Passengers may consume more when offered their preferred foods, resulting in less waste and higher satisfaction. By fostering the passengers’ understanding of the values of pre-reservation of inflight meals, airlines also can reduce overall expenses and focus on upgrading and personalizing the food items to create distinctive inflight meals. Chang and Jones [39] noted that online technology platforms might enable airlines to offer their passengers more restaurant-like, customized inflight foods if the selections are made before boarding. The major airline companies may minimize the relevant costs by reporting sustainable practices [12]. Kim et al. [47] found that airlines should actively inform their passengers about integrating sustainability programs into their businesses. They noted the importance of educating the passengers to motivate them to be highly involved in sustainability.

When composing a new service or product, examining whether the prospective customers acknowledge their values is critical. Passengers presented higher preferences toward specific airlines when they perceived value from upgrades in overall service quality [48]. Likewise, industry professionals need to investigate the monetary worth of perceived values using consumers’ willingness to pay. For example, inflight food service’s price range and product quality significantly influenced passengers’ experiences [49]. Willingness to pay is a proper construct to investigate the readiness of consumers to forecast the price point in designing new products or services for the airline industry [42]. Contrasting to the previous research that measured W.T.P. using percentages, the study attempted to reveal the estimated dollar amount passengers would pay for inflight meal upgrades using the dollar range. By reserving a flight through a mobile application, passengers no longer need to experience a delay in purchasing their tickets and avoid unnecessary time and effort [32]. The online and offline customers presented significantly different intentions of reserving online based on their age, education level, and past usage behaviors for browsers and the internet [50]. To test its feasibility, an online reservation system was examined for in-flight food service. The current research suggests alternative ways for letting passengers self-select their inflight food service to enhance their satisfaction and lower the overall food costs and food waste by reducing the surplus menu items.

2.4. Passengers’ Satisfaction and Airline Choice

Customer satisfaction is imperative for businesses to improve their profitability and retain customers. It is essential for airlines’ survival and growth [24]. It is critical to investigate environmental variables influencing customer satisfaction regularly [47]. Thus, numerous studies have researched the relevant service factors that lead to airline passengers’ satisfaction. The primary aim of utilitarian (e.g., inflight meals, priority check-in, flight schedule change) ancillary airline services is to support the passengers’ convenience and satisfying experience [25]. Passengers preferred an airline that satisfied them with its services [48]. When service qualities are highly perceived, passengers become more loyal and present higher intention to repurchase and positive word-of-mouth [51].

The passengers of Taiwanese airlines cared significantly about the quality of seating comfort along with ticket cost and airlines when choosing a flight [52]. Flight entertainment and food and beverage are considered hedonic services offered to please passengers [25]. The price range and inflight food quality significantly influenced passengers’ overall experiences [49]. The type of inflight food and its quality positively impacted overall customer satisfaction [24]. Seat comfort, food, and flight reliability are the principal elements that
most passengers consider in making airline choices [53]. Concerning sustainability, passengers’ satisfaction influenced their intentions to eat the food and ultimately contributed to food waste [18]. The study also showed that airlines might charge a premium fee for the meal items passengers favored and were willing to pay extra for. When the desired food options were available onboard, passengers wasted less food [18]. In other words, by embracing such items, airlines may expect to satisfy their customers’ onboard experience.

The characteristics of passengers’ travel behavior and demographics were often included in the airline research, as it may reveal notable findings to better understand passengers’ behaviors. However, there is a lack of research that investigates their roles in explaining behavioral intention. This is even more evident in the aviation industry, which discusses sustainability [54]. Additionally, travel or demographic information of passengers often resulted in insignificant findings in previous research [54,55]. For instance, Hwang and Choi [54] found that both men and women presented a similar willingness to pay for an environmentally friendly airline, suggesting no need to consider the role of gender in creating advertisements. It was also noted that gender or ethnicity was often disregarded in understanding airline passengers [55]. Thus, the study involved the participants’ number of travel and demographic information to examine their association with the proposed outcomes.

2.5. Research Model and Hypothesis Formulation

Due to the exploratory nature of the current study, there is no single theory that explains the associations proposed in the research framework. However, to apprehend Gen Y airline passengers traveling internationally, the study considered prevalent antecedents for behavioral intention (e.g., [30,31]) by extensively reviewing the relevant literature prior to constructing the research framework. Based on the relevant literature review, a research framework (Figure 1) was proposed to investigate the passengers’ perceptions of inflight meal options, satisfaction with inflight meals, willingness to pay, and willingness to reserve online.

**H1:** Passengers’ number of travel is associated with passengers’ willingness to pay (H1a), and willingness to reserve online (H1b).

**H2:** Passengers’ demographic information is associated with passengers’ willingness to pay (H2a), and willingness to reserve online (H2b).

**H3:** Passengers’ perceived meal options are associated with passengers’ willingness to pay (H3a), and willingness to reserve online (H3b).

**H4:** Passengers’ inflight meal satisfaction is associated with passengers’ willingness to pay (H4a), and willingness to reserve online (H4b).

![Figure 1. Proposed research framework.](image)
3. Research Methodology

Since one of the study’s primary goals was to explore passengers’ potential willingness to reserve inflight meals online to support airline sustainability, the study purposely recruited participants using convenience sampling. Although clear disadvantages (e.g., generalizability) exist for nonprobability samples, convenience sampling was employed as it is suitable for the research without generalizing the results [56]. Additionally, it has some advantages when dealing with a large population and restricted resources, including time and money [56,57]. Since the primary research purpose was to illuminate the potential of somewhat lately introduced concepts or tools (e.g., the online meal reservation), the convenience sampling technique was found to be proper.

The population involves all international flyers that are Generation Y, as they are more familiar with inflight foods and exhibit a higher probability of reserving inflight foods online for the following reasons [58,59]. Generation Y denotes those born between 1982 and 2000 [60]. They are characterized as tech-intelligent and tech-dependent [61]. With higher exposure to wireless devices [62], they are expected to be accustomed to instantaneous communication styles. Additionally, they were found to care more about efficiency, technology, and sustainability in relation to the aviation sector, and airlines were suggested to promote self-service technology for Gen Y to enjoy [58,59]. A college-aged undergraduate student sample was adequate to reflect Generation Y.

Passengers who travel internationally tend to take medium- or long-haul flights that typically offer inflight catering services. With their previous inflight food service experience, they will likely consider it an essential component of the inflight experience and more valuable than those that take domestic or shorter flights. Based on previous research that confirmed the positive effect of prior information from past experiences on perception [63,64], passengers who experienced inflight meal service experience are assumed to have some kind of perceptions, either positive or negative, and possibly consider meal as an essential component for the inflight experience. Compared to those taking short-/medium-haul or domestic flights, the passengers who take long-haul flights or travel internationally are likely to have more experience in inflight meal services. Correspondingly, long-haul and international travelers presented a significantly higher willingness to pay extra for any premium services or upgrades in seats or meals compared to those traveling on shorter-haul flights [65,66]. Thus, undergraduate students representing Generation Y who traveled internationally at least once within a year were a sufficient sample for the current research.

Research participants from five hospitality classes in the southwestern region of the United States were invited to complete the self-reported online survey. The sample size was determined using the recommended size for conducting Exploratory Factor Analysis. Based on previous research that suggested 100 as the minimum sample size, with 200 being fair [67,68], approximately 200 samples were targeted. After eliminating the participants who did not uphold the screening, including missing responses, a total of 192 responses were finalized and utilized for further analysis. Given the nature of our study, exploratory research, a sample size of 192 students seemed proper based on similar research.

The questionnaire contained the following sections. First, the respondents were asked to share information about their past traveling experiences, such as the number of international travels taken, traveling classes, and experience with special inflight meals. The second section measured passengers’ perceptions of inflight meals followed by their likelihood of selecting upgraded food items using a 7-point Likert-type scale (1 = Extremely Unlikely; 4 = Neutral; 7 = Extremely Likely). Upgraded meal item examples included organic, brand-named (e.g., Starbucks Coffee, Kobe/Angus beef, Delmont Pineapple), low-calorie, low-sodium, authentic ethnic (e.g., Mexican, Korean, or Mediterranean), and religious (e.g., Kosher, Halal) menu items. They were given four options to indicate their preferred time to reserve an inflight meal. The study provided three graphic pictures for the respondents to simulate the situation.

The respondents were asked to select the dollar range (e.g., USD 1–2, USD 3–4, USD 5–6, more than USD 7) of their willingness to pay for the upgrades in food items, such as protein,
vegetables, starch, dessert, and beverage. Willingness to pay was measured in two different ways using the range of dollar amounts and the respondents’ likelihood of paying the fee for the given example of subgroups in the inflight meal. The research tried to fragment the meal into the most evident subdivisions and see whether the passengers would have a different willingness to pay depending on their importance. For example, the protein source, often the key component of differentiating the meal types, was expected to present a significantly higher willingness to pay. Afterward, they were asked about their willingness to reserve inflight foods online and their satisfaction with current inflight meals measured on a 7-point Likert-type scale (1 = Extremely Unsatisfied; 7 = Extremely Satisfied). The last section asked the participants to indicate their usual method of reserving a flight ticket and selecting seats for the flight and demographic information. There were some questions to ensure that the participants were paying attention to the survey and the reliability of the test questions.

Based on the approach of Lynn (1986), the current study implemented two steps to ensure content validity for exploratory research: (1) a comprehensive literature review of relevant research followed by (2) experts reviewing the scale items. For reliability, Cronbach’s alpha values were obtained for the following variables: two perceived meal options obtained from Exploratory Factor Analysis ($\alpha = 0.83$) ($\alpha = 0.73$), satisfaction ($\alpha = 0.88$), willingness to pay ($\alpha = 0.61$), and willingness to reserve online ($\alpha = 0.94$). While most research utilizes a value of 0.7 as the minimum threshold for the acceptable range, some argued that values as low as 0.6 might be tolerable for exploratory research [69]. Based on the values of Cronbach’s alpha, the measurements were deemed acceptable for the current study. Two perceived meal options obtained from Exploratory Factor Analysis presented a conventional range of Cronbach’s alpha [69].

The study employed the following statistical methods: exploratory factor analysis (E.F.A.), cluster analysis, multiple regression analysis, a series of independent $t$-tests, ANOVA, and descriptive analysis directed with frequencies and valid percentages using SPSS 27. E.F.A. is a suitable tool for exploring the underlying dimensions and identifying influential factors [69]. It was conducted using the principal component analysis extraction method and varimax rotation with a factor loadings cutoff of 0.50 for retaining items. Cronbach’s alpha was employed to measure each attribute’s reliability and internal consistency. This study achieved the minimum value of 0.6 as an indication of reliability [70]. Assumptions for E.F.A. were checked using a Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett’s Test of Sphericity [71]. Test results revealed that the two assumptions are upheld.

4. Results

4.1. Sample Description

The composition of samples consisted of 22.3 percent male and 74.6 percent female. Although the non-probability sampling technique was used, the current sample presented a marginal exemplification of hospitality and tourism management university students in the U.S. According to Becker and others [72], the proportion of females (60%) enrolled in college education in the United States is much higher than that of males, about 40%. This is more evident in higher education in hospitality and tourism management majors [73]. For example, female undergraduate students accounted approximately 67% of hospitality programs in the U.S. [74]. Most survey participants were aged between 21 and 29 (46.3%). About 30% of the participants were aged 30 to 39, followed by 18 to 20 (21.8%). The largest ethnic group was Asian/Pacific Islander, consisting of 43.8%. The second leading groups were White and Hispanic/Latino, with 28% and 27%. More than 80% of the respondents indicated earning less than $30,000 for their annual income before tax deduction. Since the study collected data from the students at the university, the results on education status were probable. Approximately 61% of the respondents had high school graduate or lower education status. From their travel experience in the past, the participants had to indicate the number of times they traveled internationally within the past 12 months. The respondents who traveled one to three times a year accounted for nearly 80 percent.
The most dominant traveling class was economy, 88%, while the business class accounted for 8.5%.

4.2. Reservation Time and Method, and Specialized Meals

As noted in Table 2, over 70% of respondents preferred to reserve their inflight meals online around the time, either before or after selecting seats for their flights. This brings an essential element: prospective passengers prefer the online reservation of inflight foods before coming to the airport. Although the result was as expected since the study sample was university students known as tech experts, the study confirmed that the participants would use an online reservation system to decide their inflight foods. More than half of the entire sample wanted to choose their foods after selecting their seats online rather than before. From the result, it is reasonable to state that Generation Y favors online communication regarding inflight meals. Airlines may design their reservation system to provide a meal selection option after selecting seats for their passengers. Less than thirty percent of the respondents wanted to wait and decide on their food while checking in at the airport. This may imply that the respondents are willing to select their meals as early as, even before selecting their seats. It highlights the potential for airlines to allocate meals systematically.

Table 2. Passengers’ Desired Time to Reserve Inflight Foods.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before choosing the flight seat online</td>
<td>34</td>
<td>19.3</td>
</tr>
<tr>
<td>After choosing the flight seat online</td>
<td>94</td>
<td>53.4</td>
</tr>
<tr>
<td>Checking in at the airport with a flight attendant</td>
<td>20</td>
<td>11.4</td>
</tr>
<tr>
<td>Checking in at the airport using a kiosk</td>
<td>28</td>
<td>15.9</td>
</tr>
<tr>
<td>Total</td>
<td>176</td>
<td>100.0</td>
</tr>
</tbody>
</table>

More than 80% of the participants indicated that they typically reserve their tickets online using a smartphone, computer, or tablet, as displayed in Table 3. Although significantly less, about ten percent of the respondents still used the traditional phone call method to reserve a flight. The study found similar results for seat reservations. For both flight and seat reservation, the computer was the dominantly used device. The other notable difference was those remarkably more participants, about 20%, used computers for selecting a seat rather than reserving a flight.

Table 3. Passengers’ Typical Reservation Method.

<table>
<thead>
<tr>
<th>Items</th>
<th>Flight Ticket Frequency (Percentage)</th>
<th>Flight Seat Frequency (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calling by phone</td>
<td>17 (9.4)</td>
<td>10 (5.4)</td>
</tr>
<tr>
<td>Online with smartphone</td>
<td>27 (14.9)</td>
<td>23 (12.5)</td>
</tr>
<tr>
<td>Online with computer</td>
<td>106 (58.6)</td>
<td>139 (75.5)</td>
</tr>
<tr>
<td>Online with tablet</td>
<td>28 (15.5)</td>
<td>7 (3.8)</td>
</tr>
<tr>
<td>Others</td>
<td>3 (1.7)</td>
<td>5 (2.7)</td>
</tr>
<tr>
<td>Total</td>
<td>181 (100.0)</td>
<td>184 (100.0)</td>
</tr>
</tbody>
</table>

Approximately 80% of the respondents have never ordered specialized inflight meals for their travel. Only about ten percent of the total sample indicated that they previously ordered a special inflight meal service for their trips. About 70 percent of the participants who experienced a specialized inflight meal indicated that they often ordered special meals for air travel, while the rest always ordered them. Although there were few responses, there were some valuable reasons to be considered. Nearly 40% of the participants stated that they were not satisfied with the current meal and, thus, ordered special meals. The
second main reason for passengers ordering special meals was their desire to be in charge of selecting their foods, 22%. The passengers who ordered special meals for their personal preferences or wanted to explore new meal options had the equivalent percentage, 13%. Interestingly, less than 5% of the respondents who requested special foods chose inflight food service for their medical condition. On the other hand, most participants who never ordered special meals onboard may imply that they would take regular meals offered by the airline. According to [75], the two prominent reasons that passengers consume inflight meals are to fulfill their hunger, or because it is the only complimentary option provided onboard.

4.3. Willingness to Pay for Meal Upgrades

The study displayed that about 70% of the survey respondents will pay three USD or more, while about 12.1% will pay more than seven USD for an upgraded protein. Table 4 displays the overall results on W.T.P. Interestingly, nearly 50% of the respondents were W.T.P. at least three USD or more for upgraded dessert. As the second highest item, about 60% of respondents were willing to pay no more than two USD for upgraded vegetables. Among the five inflight food items presented, the highest percentage of the participants (12.1%) indicated that they would pay more than seven USD for protein sources (e.g., meat, legume, and seafood). The second item that the participants are willing to pay for more than seven USD was vegetables, 7.3%. The most considerable proportion of participants indicated that they would only pay one or two USD for starch (57.5%), dessert (50.8%), and a beverage (64.8%). The average score for inflight food items was computed from the range in upgraded fees for USD amounts. On average, the respondents indicated that they would pay roughly three USD if other items (e.g., organic, brand name, low-calorie, low-sodium) were offered to substitute traditional inflight foods.

Table 4. Passengers’ Willingness To Pay for Upgrades.

<table>
<thead>
<tr>
<th>Inflight Food Items</th>
<th>Protein M = $3.72</th>
<th>Vegetable M = $3.25</th>
<th>Starch M = $2.59</th>
<th>Dessert M = $2.85</th>
<th>Beverage M = $2.49</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD 1–2</td>
<td>56 (31%)</td>
<td>83 (43.5%)</td>
<td>111 (57.5%)</td>
<td>98 (50.8%)</td>
<td>125 (64.8%)</td>
</tr>
<tr>
<td>USD 3–4</td>
<td>66 (36.5%)</td>
<td>59 (30.9%)</td>
<td>63 (32.6%)</td>
<td>66 (34.2%)</td>
<td>44 (22.8%)</td>
</tr>
<tr>
<td>USD 5–6</td>
<td>37 (20.4%)</td>
<td>35 (18.3%)</td>
<td>14 (7.3%)</td>
<td>21 (10.9%)</td>
<td>19 (9.8%)</td>
</tr>
<tr>
<td>More than USD 7</td>
<td>22 (12.1%)</td>
<td>14 (7.3%)</td>
<td>5 (2.6%)</td>
<td>8 (4.1%)</td>
<td>5 (2.6%)</td>
</tr>
</tbody>
</table>

The participants were willing to pay the highest dollar amount, USD 3.72, for any upgrades in protein, followed by USD 3.25 for vegetables. Based on the percentage, while vegetable was ranked second among the five food items, given that the standard food cost percentage is somewhat less than that of protein, the study result can be used as an advantage for airlines to reduce costs by selecting the proper items. However, it is crucial for airlines to carefully choose the item types. From a case study of the Halal food production process, at least 40% of the total food waste was produced from vegetables [9]. From the dollar average of willingness to pay, the participants ranked beverage the last, USD 2.49. This may be because the study only addressed non-alcoholic beverages. Almost 90% of the participants were economy passengers. However, they were willing to pay USD 2.59 for starch and USD 2.85 for dessert. The standard food cost percentage for starch or beverage is expected to be lower when compared to protein sources. Airlines may systematically strategize the study results if planned accordingly to design inflight meals. All values are displayed in Table 5.
Table 5. The Ranks of Inflight Meal Upgrade Options.

<table>
<thead>
<tr>
<th>Meal Upgrade Options</th>
<th>Rank</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety menu options</td>
<td>1</td>
<td>4.71</td>
<td>1.67</td>
</tr>
<tr>
<td>Customized menu options</td>
<td>2</td>
<td>4.63</td>
<td>1.74</td>
</tr>
<tr>
<td>Well-known brand-name items</td>
<td>3</td>
<td>4.55</td>
<td>1.79</td>
</tr>
<tr>
<td>Authentic ethnic menu items</td>
<td>4</td>
<td>4.45</td>
<td>1.85</td>
</tr>
<tr>
<td>Nutrition information provided on your menu items</td>
<td>5</td>
<td>4.41</td>
<td>1.80</td>
</tr>
<tr>
<td>A la carte menu options instead of a set menu</td>
<td>6</td>
<td>4.33</td>
<td>1.75</td>
</tr>
<tr>
<td>Naturally flavored beverage</td>
<td>7</td>
<td>4.19</td>
<td>1.86</td>
</tr>
<tr>
<td>Low-calorie food items</td>
<td>8</td>
<td>3.97</td>
<td>1.84</td>
</tr>
<tr>
<td>Low-calorie beverage</td>
<td>9</td>
<td>3.92</td>
<td>1.88</td>
</tr>
<tr>
<td>Menu options for religious reasons</td>
<td>10</td>
<td>3.50</td>
<td>1.95</td>
</tr>
</tbody>
</table>

4.4. Inflight Meal Choice Factors

As displayed in Table 5, the respondents were most likely to choose inflight meals when a variety of menu options were provided, and they valued the option of receiving what they wanted to eat as the second highest. The study presented the supporting result that the passengers would appreciate more variety in inflight food service items [24]. Inflight meals made of well-known brand names were ranked third, followed by authentic ethnic menu items. On the contrary, the religious menu option (e.g., Kosher, Halal) was ranked as the lowest, at 3.50. While healthy menu options were highlighted over the years, and some noted that passengers would prefer healthier food options if provided onboard, the research found somewhat contradicting results. The factors that addressed health, such as nutrition, natural, and low-calorie, were ranked relatively lower than others. Examples of well-known brands include Delmont, Ben & Jerry, Jamba Juice, etc.

Exploratory factor analysis was conducted using principal component analysis extraction and varimax rotation for 10 inflight meal upgrade options. Based on the low communality scores and enhancement of Cronbach’s alpha if item was deleted, two scale items with communality scores of 0.436 and 0.420 were excluded. As a result, two influential factors were found with a total variance of 67.186% and labeled as health and religious needs (Factor 1) and variety-seeking needs (Factor 2), as presented in Table 6.

Table 6. Scale Items and Exploratory Factor Analysis (E.F.A.) Results.

<table>
<thead>
<tr>
<th>Eigenvalues</th>
<th>Cronbach’s Alpha</th>
<th>Factor 1 Health and Religious Needs</th>
<th>Factor 2 Variety-Seeking Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-calorie beverage</td>
<td>0.862</td>
<td>4.263</td>
<td>0.830</td>
</tr>
<tr>
<td>Menu options for religious reasons</td>
<td>0.778</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naturally flavored beverage</td>
<td>0.766</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition information provided</td>
<td>0.689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well-known brand-name items</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variety menu options</td>
<td></td>
<td></td>
<td>0.809</td>
</tr>
<tr>
<td>Authentic ethnic menu items</td>
<td></td>
<td></td>
<td>0.753</td>
</tr>
<tr>
<td>A la carte (single) menu options</td>
<td></td>
<td></td>
<td>0.744</td>
</tr>
</tbody>
</table>

Cumulative percentage of variance explained: 35.612% for Factor 1, 67.186% for Factor 2.

Note. KMO = 0.863; Bartlett test of sphericity: $\chi^2 = 691.050, df = 28, p < 0.001.$

4.5. Passenger Groups in Relation to Inflight Meals

Cluster analysis was implicated using four constructs. By including the passengers’ inflight meal choice factors (e.g., health/religious and variety-seeking needs) and satisfaction with a traditional inflight meal (S.A.T.) along with their willingness to pay for upgrades in the inflight meal (W.T.P.) and willingness to reserve inflight meal online (WTRO), K-means cluster analysis based on their standardized z scores was implemented and resulted in
two meaningful clusters. Cluster 1, an indifferent but noble group, hardly cared about any upgrades (e.g., organic, low-calorie) in the inflight meal but presented significantly low satisfaction toward the standard meal compared to cluster 2. While they were willing to pay an upgrade fee as much as cluster 2 for inflight meal upgrades, cluster 1 was highly unlikely to choose inflight foods online. Since cluster 1 was characterized as indifferent about inflight meals in general, it was natural for the members to have less likelihood to upgrade the meal. However, they were also less captivated by the options of substituting an inflight meal for a discount on airfare or complimentary airport lounge access when compared to cluster 2.

Cluster 2 was characterized as content but the parsimonious group. They were highly satisfied with the standard inflight meals and were highly willing to reserve them online before coming to the airport, as presented in Table 7. Although participants greatly desired both health/religious and a variety of inflight meal options, they had relatively less desire to pay for them. Interestingly, the members of cluster 2 would want the other service upgrades instead of the traditional inflight meal, although they were highly satisfied with the current meal service onboard. Both clusters would pay approximately three USD for inflight meal upgrades and had insignificant disparity in their willingness to pay. It is interesting to note that the indifferent but noble group who hardly desired healthy and religious or various kinds of meal offerings would pay the equivalent fee for the upgrades. Conversely, the parsimonious but content group members indicated that they appreciate the healthy, religious, and various options in inflight meals. However, their willingness to pay for such upgrades was not significantly higher but about the same for those in the indifferent but noble cluster.

Table 7. Means, Standards Deviations, and t-test for 2 Clusters.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Cluster 1 Indifferent but Noble N = 88</th>
<th>Cluster 2 Content but Parsimonious N = 105</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Health and Religious Needs</td>
<td>3.39</td>
<td>1.23</td>
<td>5.01</td>
<td>1.31</td>
</tr>
<tr>
<td>Variety Seeking Needs</td>
<td>3.18</td>
<td>1.25</td>
<td>5.42</td>
<td>1.35</td>
</tr>
<tr>
<td>Willingness To Pay (in dollars)</td>
<td>2.89</td>
<td>1.08</td>
<td>3.02</td>
<td>1.24</td>
</tr>
<tr>
<td>Willingness To Reserve Online</td>
<td>2.63</td>
<td>1.40</td>
<td>5.20</td>
<td>1.23</td>
</tr>
<tr>
<td>Meal Upgrade with Fee</td>
<td>3.73</td>
<td>1.54</td>
<td>4.57</td>
<td>1.63</td>
</tr>
<tr>
<td>No meal but other upgrades</td>
<td>3.65</td>
<td>1.57</td>
<td>4.78</td>
<td>1.57</td>
</tr>
<tr>
<td>Inflight Meal Satisfaction</td>
<td>3.77</td>
<td>1.16</td>
<td>4.68</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Note. * p < 0.007.

By cross-tabulating the clusters with travel traits and demographic information, both clusters presented a similar presentation of the number of travels, annual income before tax, and education. Cluster 2 (n = 17) traveled somewhat more using first or business class than cluster 1, n = 7. While a total of 23 respondents indicated that they requested special meals onboard, more than 65% (n = 15) of them were in cluster 2. Almost half of cluster 1 indicated their age to be between 30 and 39, while approximately 60% of cluster 2 members were 21–29. A dominant ethnic group in cluster 1 was White (38%) and Hispanic or Latino (44%), while it was Asian/Pacific Islander (67%) for cluster 2.

Based on the clusters, a series of independent t-tests were conducted to compare the means of the average for each upgraded condition (e.g., organic, brand name, low calorie, low sodium) and each a la carte item (e.g., protein, vegetable, starch, dessert, beverage) in inflight meals. While cluster 1 was apathetic to upgraded inflight items in general, cluster 2 presented a significantly higher likelihood of choosing organic and brand-name options, although a fee was involved (please refer to Table 8). While both groups displayed neutral and analogous likelihood of choosing low sodium, cluster 1 was significantly less likely to select and pay for low-calorie inflight meals than cluster 2. Regarding unbundling
the meal, the content but parsimonious group members were highly likely to choose upgraded protein, dessert, or beverage. From the study results, airlines should focus more on enhancing the quality of protein, desserts, and beverages than that of vegetables and starch.

Table 8. Means, Standards Deviations, and t-test for 2 Clusters.

<table>
<thead>
<tr>
<th>Upgrade Items</th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indifferent but Noble</td>
<td>Content but Parsimonious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N = 88</td>
<td>N = 105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>3.66 ± 1.74</td>
<td>4.53 ± 1.84</td>
<td>−3.372</td>
<td>0.001 *</td>
</tr>
<tr>
<td>Brand Name</td>
<td>3.72 ± 1.54</td>
<td>4.57 ± 1.62</td>
<td>−3.697</td>
<td>0.000 *</td>
</tr>
<tr>
<td>Low Calorie</td>
<td>3.65 ± 1.61</td>
<td>4.41 ± 1.70</td>
<td>−3.163</td>
<td>0.002 *</td>
</tr>
<tr>
<td>Low Sodium</td>
<td>3.70 ± 1.66</td>
<td>4.28 ± 1.65</td>
<td>−2.448</td>
<td>0.015 *</td>
</tr>
<tr>
<td>Protein</td>
<td>3.54 ± 1.45</td>
<td>4.47 ± 1.65</td>
<td>−4.125</td>
<td>0.000 *</td>
</tr>
<tr>
<td>Vegetable</td>
<td>3.76 ± 1.59</td>
<td>4.40 ± 1.61</td>
<td>−2.751</td>
<td>0.007 *</td>
</tr>
<tr>
<td>Starch</td>
<td>3.76 ± 1.54</td>
<td>4.34 ± 1.62</td>
<td>−2.494</td>
<td>0.013 *</td>
</tr>
<tr>
<td>Dessert</td>
<td>3.70 ± 1.60</td>
<td>4.54 ± 1.76</td>
<td>−3.446</td>
<td>0.001 *</td>
</tr>
<tr>
<td>Beverage</td>
<td>3.64 ± 1.49</td>
<td>4.47 ± 1.58</td>
<td>−3.722</td>
<td>0.000 *</td>
</tr>
</tbody>
</table>

Note. * p < 0.0056.

4.6. Test of Hypothesized Model

To examine the hypothesized relationships, the study employed a multiple linear regression analysis for passengers’ willingness to pay and willingness to reserve inflight meals online using passengers’ satisfaction with the current inflight meals, number of travel experiences, annual income before tax, age, health, and religious needs, and variety-seeking needs. These variables statistically significantly predicted the willingness to reserve online, $F(6, 175) = 13.551, p < 0.0005, R^2 = 0.317$. Among all variables examined, variety-seeking needs and age variables added statistical significance to predicting passengers’ willingness to reserve inflight meals online, $p < 0.01$. Please see the details in Table 9. The general form of the equation to predict passengers’ willingness to reserve inflight meals online = 5.338 + (1.463 × health and religious needs) + (2.629 × variety seeking needs) − (1.942 × annual income before tax) − (0.752 × number of travel) − (3.484 × age) + (1.106 × meal satisfaction). This means that for each increase in variety-seeking needs, there is an increase in passengers’ willingness to reserve inflight meals online (H3b: partially supported). Inversely, with each increase in age, there is a decrease in passengers’ willingness to reserve inflight meals online, representing that the respondents in the younger age range would be more willing to reserve inflight meals online than those in the higher age group (H2b: partially supported). These study results confirm that technology readiness is more evident for younger age groups, and the online reservation system may be marketed accordingly. The same analysis was conducted using the same variables to predict the passengers’ willingness to pay for inflight meals, but insignificant results were found. None of the variables contributed to their willingness to pay.

Additionally, independent $t$-tests and one-way analysis of variance (ANOVA) were implicated in investigating the mean differences in passengers’ satisfaction, willingness to pay, and willingness to reserve online based on their demographic and travel info. For ANOVA, the study used the most typical method of adjusting the alpha level to reduce Type I error: Bonferroni type was used [76]. The necessary assumptions (e.g., independence, homogeneity of variance, outliers) for the samples were verified before conducting ANOVA. A one-way ANOVA displayed a significantly different average score between the two groups, $F(4, 182) = 12.159, p < 0.001$. A Scheffe post hoc test found that the mean value of respondents’ willingness to reserve inflight foods online score was significantly different, between 18–20 and 30–39 ($p < 0.001$, 95% C.I. = 0.71, −3.10). It was statistically significantly higher for 18-20 years (4.69 ± 1.55) compared to 30–39 years (2.78 ± 1.42). Additionally, multiple comparisons revealed a significant difference between the age groups of 21–29 and
30–39 ($p < 0.001, 95\% \text{ C.I.} = 0.81, -2.78$) and 18–20 and 30–39 ($p < 0.001, 95\% \text{ C.I.} = -0.71, -3.1$). The participants of 18-20 (4.69 ± 1.55) and 21–29 years (4.57 ± 1.80) had significantly higher willingness to reserve foods online compared to those of 30–39 years (2.78 ± 1.42). There was no statistical difference found between age groups for willingness to pay and satisfaction with the current inflight meal.

Table 9. Multiple Regression Results for Passengers’ Willingness To Reserve Online.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>SE</th>
<th>LL</th>
<th>UL</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.513</td>
<td>0.658</td>
<td>2.214</td>
<td>4.812</td>
<td>0.000</td>
</tr>
<tr>
<td>Health and Religious Needs</td>
<td>0.154</td>
<td>0.105</td>
<td>-0.054</td>
<td>0.362</td>
<td>0.145</td>
</tr>
<tr>
<td>Variety Seeking Needs</td>
<td>0.291</td>
<td>0.111</td>
<td>0.072</td>
<td>0.509</td>
<td>0.009**</td>
</tr>
<tr>
<td>Annual Income Before Tax</td>
<td>-0.160</td>
<td>0.082</td>
<td>-0.323</td>
<td>0.003</td>
<td>0.054</td>
</tr>
<tr>
<td>Number of Travel</td>
<td>-0.097</td>
<td>0.128</td>
<td>-0.350</td>
<td>0.157</td>
<td>0.453</td>
</tr>
<tr>
<td>Age</td>
<td>-0.579</td>
<td>0.166</td>
<td>-0.907</td>
<td>-0.251</td>
<td>0.001**</td>
</tr>
<tr>
<td>Inflight Meal Satisfaction</td>
<td>0.104</td>
<td>0.094</td>
<td>-0.081</td>
<td>0.288</td>
<td>0.270</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval; LL = lower limit; UL = upper limit; ** $p < 0.01$.

A post hoc test of Scheffe revealed that the mean value of respondents’ willingness to reserve inflight foods online score was significantly different, $F(2, 186) = 49.084$, $p < 0.001$, between the ethnic groups of White and Asian/Pacific Islander ($p < 0.001, 95\% \text{ C.I.} = -2.60, -1.12$) and Hispanic or Latino and Asian/Pacific Islander ($p < 0.001, 95\% \text{ C.I.} = -3.15, -1.65$). The participants in the ethnic groups of Asian/Pacific Islander (5.20 ± 1.24) were willing to reserve inflight meals significantly more when compared to those in the groups of White (3.34 ± 1.75), Hispanic, or Latino (2.80 ± 1.57). The average scores of respondents’ inflight meals satisfactions in Hispanic or Latino and Asian/Pacific Islander ($p < 0.001, 95\% \text{ C.I.} = -1.58, -0.38$) groups presented a significant difference between two groups $F(2, 186) = 10.701$, $p < 0.001$. The Hispanic or Latino participants (3.75 ± 1.07) were significantly less satisfied with the current inflight meals than Asian/Pacific Islanders (4.73 ± 1.26). The willingness to pay, there was no statistical difference found. Using an independent $t$-test, the research found that the participants with Associate, Bachelor’s, or Master’s degrees (4.43 ± 1.69) presented a significantly higher willingness to reserve inflight meals online compared to those with high school degrees or lower education (3.75 ± 1.87), $t(190) = -2.565$, $p = 0.011$. Sociodemographic information is often not successful in segmenting travelers, and there is a need to explore different ways to reveal meaningful passenger segmentation [37]. Regardless, it is a fundamental element for airlines to consider when they want to understand better and target their passengers. Concerning the successful delivery of corporate social responsibility, highly educated passengers became loyal to the airlines that practiced philanthropic responsibilities [11]. The current research found significant mean differences in the respondents’ age, ethnicity, and education level. Contrarywise, the number of air travel trips in a year did not reveal any difference.

The study focused on suggesting ways to highlight environmental and economic sustainability by addressing the potential advantage of airlines promoting online meal reservations. By encouraging passengers to reserve inflight meals promptly and airlines to include items that passengers are willing to pay for or select online, airlines may lower their overall cost for food with a reduced amount of airline cabin waste for a lesser carbon footprint.

5. Discussions and Conclusions

The role of inflight meals in building the distinctiveness of airlines has been a controversial issue that airline industry marketers and researchers have hardly investigated. As noted previously, airlines should constantly work on recognizing the relevant inflight meal variables and discovering any customers’ demand changes. The current research explored the participants’ perception of inflight meals and their subgroups to reveal potentially
valuable factors in selecting their meal choice. The research investigated the passengers’ willingness to pay for the upgraded (e.g., organic, brand named) and a la carte (e.g., protein, dessert) meal items. The study examined the passengers’ willingness to reserve inflight meals online and recommended the potential advantages of suggesting passengers reserve inflight meals online to foster sustainability. The study presented valuable insights for airline companies regarding inflight meals and suggested sustainable practices and marketing plans.

To better understand passengers’ perception and willingness for inflight meals, the study included relevant and meaningful constructs as suggested by the previous research [30,31,55]. While existing studies on airlines have primarily focused on reinforcing the relationship between satisfaction and passengers’ re-flying or repurchase intention, our study intended to empirically test the passengers’ willingness to pay and reserve meals online, which may build distinctiveness and potentially positive influence on re-flying intention. The study result confirmed the positive influence of the passengers’ perceived value for inflight meals (e.g., variety of options) on their behavioral intention (e.g., willingness to reserve meals online) in the airline context [30,31]. This is similar to a previous study that found tourists would pay more for hotel services they perceived as valuable when they were satisfied with the service offered [77]. Conversely, the most widely included construct, satisfaction, presented an insignificant association with behavioral intention, suggesting that inflight meal satisfaction is not contributing to passengers’ willingness to pay or reserve meals online. Similar to other research [20,55], passengers’ willingness to pay or reserve online for inflight meals did not present any meaningful difference based on their travel or demographic information, except age for WTRO.

The current study highlights the potential of promoting prompt online meal reservations to support environmental and economic sustainability in the airline industry. The study results confirmed that research participants were willing to select their inflight meals if an online reservation option was provided when purchasing tickets online. This highlights the potential of online meal reservations being strategically utilized to accommodate passengers’ needs and minimize unnecessary, surplus food to uphold environmental sustainability. It may be beneficial for airlines to communicate the benefits of pre-selecting the meals to their passengers regarding sustainability. The research also found that most participants are likely to reserve their inflight meals online when various options are offered for them to choose from. Airlines should consider expanding their inflight meal selections in the reservation phase and merely lading the passenger-selected inflight meals while minimizing unnecessary costs related to inflight meal service. Additionally, by providing more tailored airline meal options, airline marketers may expect to build distinctiveness to incorporate a simple but innovative approach at relatively low costs for economic sustainability.

Most participants indicated that they typically reserved their flights and seats online. Although nearly 20% preferred to make the selection while checking in at the airport using a kiosk, most respondents were willing to reserve inflight meals online before checking in at the airport. This highlights the feasibility of recommending early reservations of meals to passengers. Less than 15% of the respondents ordered special inflight meals for their flights. Their dissatisfaction with the regular meal options was the most apparent reason for ordering special meals. The second popular reason was the participant’s ability to select their favored option, followed by the desire for new items and accommodation of personal preferences. The research also found the price range of passengers’ willingness to pay for inflight meal items. The study findings highlight the importance of finding better ways to engage passengers in developing new inflight food items. The respondents were willing to pay the highest dollar amount of USD 3.72 for an upgraded protein, followed by vegetables for USD 3.25. This may indicate the importance of broadening the protein or vegetable options for inflight meals. Starch and beverage were the items passengers were willing to pay the least, respectively, USD 2.59 and USD 2.49. From the study results, airlines may
earn higher revenue by constructing suitable price tactics for the meal items and type the respondents are willing to pay.

The study ranked the respondents’ likelihood of selecting inflight meals when distinctive options were available. The top three features of inflight meals included variety, personalized items, and well-known branded items, which may be helpful for airlines to build distinctive inflight meals. Similarly, the passengers were less satisfied with their meals when they came without assorted meal options [75]. In relation to inflight meals, Hwang and Choi [20] noted that airlines should consider expanding meal options and possibly using environmentally friendly ingredients. By offering various meal types, the airlines may accommodate their passengers’ diverse and personal preferences and satisfy them. The current study found that passengers would select their inflight meals when offered various meal options rather than designing healthy or specialized (e.g., religious) meals. This aligned with previous research that found food service customers are willing to pay more for tailored products that accompany a wide assortment [78]. However, it becomes a challenge for airlines to create more meal types or options as it will incur higher food costs and waste. For instance, although the customers’ needs for a wide variety and customization are evident, airlines mainly focus on limiting them, as it is directly linked with higher costs [39]. Additionally, a la carte inflight menu options were ranked somewhat low. Thus, the research results for participants’ higher willingness to pay may be utilized in modifying a few options (e.g., protein or vegetable) instead of an entire meal. Customizing menu options with a higher willingness to pay may encourage passengers to choose inflight meals when purchasing the tickets. Healthy inflight meal elements (e.g., naturally flavored, low-calorie) were ranked the lowest. Health/religious and variety-seeking needs were discovered as the contributing factors for the participants to decide on inflight meals. The participants were grouped using the relevant elements of inflight meals, such as inflight meal choice factors (e.g., health/religious and variety-seeking needs), satisfaction with traditional inflight meals, willingness to pay for upgrades in inflight meals, and willingness to reserve inflight meals online. Two meaningful clusters, (1) indifferent but noble and (2) content but parsimonious, were found.

Both clusters were willing to pay analogous dollar amounts, approximately USD 3, for any meal option upgrades. Although cluster 1 (insensitive to inflight meals) presented significantly lower satisfaction toward current inflight meals and willingness to reserve them online, they rarely cared about healthy/religious and variety of meal options. Interestingly, they still wanted some kind of meal served onboard and would not select other upgrades over complimentary meals. Cluster 2, on the other hand, wanted more options and would pay fees for meal upgrades; nevertheless, they presented a significantly higher satisfaction toward traditional inflight meals. It is recommended that airline industry professionals recognize the characteristics of the participants that are willing to pay for upgraded or special meals. A typical member of cluster 2 who presented a somewhat similar willingness to pay but desired upgrades with a willingness to reserve meals early can be characterized as 21–29 years old, with a majority of Asian/Pacific Islanders who ordered special meals relatively more than the other cluster members.

A well-designed inflight food service attribute has been argued as a leading contributor to building a thriving airline business [24]. The respondents presented higher satisfaction toward the meals onboard when they had a stronger desire for various inflight meals. Similarly, they were highly willing to reserve inflight meals online when they had a relatively high preference toward various meal options and were in comparatively younger age groups. The 18–20- or 21–29-year-old participants were willing to reserve inflight meals online significantly more than those 30–39. The respondents in ethnic groups White and Hispanic or Latino were less likely to reserve inflight meals than those of Asian/Pacific Islander ethnicity. Asian/Pacific Islanders presented the highest satisfaction score for current inflight meals, while Hispanic or Latino participants were the least satisfied. The study found that the higher the education level of research participants, the higher their willingness to reserve inflight meals online. The previous research noted that customers’ online
reservation intentions differed substantially based on their demographic and behavioral information [50]. Unlike previous research that found passengers who frequently fly with higher income purchase additional food and drink as they want [79], the research revealed an insignificant influence of age but a significant impact on online meal reservations. As they are characterized as tech-savvy [61], younger passengers presented a significantly higher willingness to reserve inflight meals online.

While suggesting passengers to select their inflight food may enable them to receive optimal meals, only a limited number would pre-order them [18]. Conversely, the current study revealed that more than 72% of the participants were willing to reserve their meals when they selected their seats online. This may reflect the participants' readiness to use the online system to reserve their flights, seats, meals, and other ancillary services. It also highlights that online meal reservations could positively contribute to deciding the demand for inflight meals and planning the food production schedule for airlines. At the same time, when the two clusters were compared, the research revealed that the indifferent but noble (vs. content but parsimonious) cluster presented significantly less willingness to reserve their meals online. However, indifferent but noble cluster members would still be somewhat pleased with standard onboard meals with any option available. Based on the study result, airlines may allocate meals accordingly. Most airlines tend to serve the passengers who request specialized inflight meals or kids’ meals first and then move on to the rest of the passengers. Likewise, passengers who reserved their meals online may be served first, followed by those who did not. Since the research suggests that passengers indifferent to inflight foods rarely care about reserving orders, they may be served later and be less sensitive about fewer inflight meal options.

In a hospitality context, there is a need to reveal managerial methods to mitigate food waste [16]. Thus, the current study highlighted the effectiveness of inflight meal prevention and redistribution in the airline industry. The prevention stage involves forecasting demands or managing the inventories proactively. In contrast, the redistribution stage, accelerated by technology such as smartphones, includes identifying the time/area for improving or finalizing the final count of inflight meal choices. As noted in the sustainability primer report from the U.S. Environmental Protection Agency, most researchers utilize environmental, economic, and social pillars to comprehensively understand sustainability. However, the origin of the conceptual model is indefinite and more of a gradual accumulation from diverse sources [19]. From the study results, airlines may support social sustainability by educating prospective passengers about the benefits of utilizing the inflight meal online reservation to reduce cabin waste and sharing information about sustainable practices.

This is aligned with the importance of utilizing new technology-enhanced methods to train employees to build corporate social responsibility [9,47]. Companies that aim to uphold sustainability should explore the elements that contribute to a green image and educate their passengers on the significance of their involvement in green practices [47]. This may highlight the importance of notifying the passengers to reserve their meals early to reduce food waste and the cost of an airline. As an example of environmentally sustainable practices, airlines may promote inflight meal reservations online and consider offering genetically modified or organic inflight meal options to lessen food waste and gas emissions. By employing and recommending an online reservation system for inflight meals to represent innovative technology, airlines may also expect to obtain economic sustainability. The study results suggest that providing an option for passengers to choose their meals served onboard online, before boarding, and at a closer time to purchasing their tickets will be beneficial. Similar to the previous research that discussed the benefits of mass customization [39], this may enable lean production and just-in-time inventory and, ultimately, reduce cabin/food waste and overall costs. When passengers indicate their meal selections early enough, airlines may load an adequate number of inflight meals accordingly, producing fewer discarded items. Passengers served with their choice of favorable inflight meal types may be assumed to consume more and generate less waste.
Both approaches will result in fewer expenses for airlines. Airlines may perhaps feature the research findings concerning passengers’ willingness to select their meals, including any upgrades, and pay for the upgraded items. The possible use of inflight meals to upcharge for ancillary service may benefit airlines in building a better pricing strategy. Nidumolu et al. [5] noted that successful companies take tiny, flexible steps in adapting to trends and expanding accordingly. Thus, to promote sustainability and corporate social responsibility, it is critical for airline businesses to gradually modify their current practices, such as inflight meal offerings, recommending online meal reservations, educating their passengers about the impact of cabin waste, and delivering marketing messages.

6. Limitations and Future Research Directions

Although the current case study, as exploratory research, provides potential opportunities and exciting information related to inflight meals, some limitations must be pointed out. The study limitation includes a limited sampling frame. Since the study used convenience sampling, the research findings cannot be generalized and must be carefully interpreted. The capture of a specific range of generations restricts the generalizability of the study result to overall passengers. Although a sample of undergraduate students was intentionally selected to represent a single generation, Gen Y, to reveal the potential of the online meal reservation system, the findings cannot be generalized to the rest of the population. Although current research purposely collected data from Gen Y, who mainly traveled with economy traveling class, future research should include a broad range of passengers, different generation cohorts, and other traveling classes to reveal meaningful differences in their perception of inflight meals. A follow-up study is recommended to investigate the influence of combining marketing messages for environmental sustainability with online meal reservations on a positive brand image or higher re-flying intention toward an airline. Since the study did not have a comprehensive list of inflight meal options, future research should explore more meal selections and examine passengers’ preferences. Further research could also test the findings in different cultures and countries.


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