In-flight food delivery and waste collection service: the passengers' perspective and potential improvement

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Abstract. Increased competition in the commercial air transportation industry has made service quality of the airlines as one of the key competitive measures to attract passengers against their rivals. In-flight services, particularly food delivery and waste collection, have a notable impact on perception of the overall airline's service quality because they are directly and interactively provided to passengers during flight. An online public survey is conducted to explore general passengers' perception of current in-flight food delivery and waste collection services, and to identify potential rooms for improvement. The obtained survey results indicate that in-flight service does have an effect on passengers' choice of airlines. Several weaknesses of the current service method and possible improvements have been established from the collected responses.

1. Introduction
In recent years, air travel has become one of the main transport means for many people. According to the forecast made by the International Air Transport Association (IATA), the total number of airlines' passengers will reach up to 7 billion by the year 2034 [1]. In addition, Airbus has reported that more than 70% of next 20-year demand for their new passenger and freight aircraft are for single-aisle type [2], signifying progressive increase in short-haul, domestic flight routes worldwide. This development in the air transportation industry also means an increased competition among large and small airlines to draw passengers for their offered flight services. Many innovative strategies have been applied by airlines to differentiate their services from each other. Maintaining and improving the service quality has been a key competitive measure in air transportation industry, especially in attracting passengers from competing airlines [3].

One of the direct airline services that can affect passengers' evaluation towards the airlines is their in-flight services [4], which in-flight meal service has been the main central element [5]. It is observed that passengers tend to select the airlines that provide the best meals or foods for their travel and this is highlighted in a published study that links the quality of in-flight food services to passengers' intention of re-flying with the airlines [6]. It is believed that the current method used onboard for food delivery and waste collection can be further improved. Note that the waste collection service goes hand-in-hand with the in-flight food delivery service, and therefore they are considered together in this study. With this notion, the aims of this paper are to explore the general passengers' perception of the current in-flight food delivery and waste collection services, and to identify potential rooms for improvement. In order to achieve this, an online public survey has been conducted and the obtained results have been analyzed.
2. Current in-flight food delivery and waste collection

Among the earliest recorded history of in-flight food services was in the 1920s by Imperial Airways in the United Kingdom (UK), which started to serve tea and coffee during their flights along with a few variations of cold items such as ice cream, cheese, fruits, lobster salad and cold chicken [7]. Regular hot meals were then introduced in the mid-1930s and became more common in airlines after a bigger galley was first designed by Imperial Airways for their DC3 aircraft to enable extensive hot meals to be served onboard during flight [6]. Modern and more sophisticated equipment for in-flight dining, much like the ones used by airlines today, were introduced in the mid-1950s by Boeing in their B737 aircraft. The Boeing B737 aircraft’s galley was the first to be equipped with several catering functions including aircraft ovens and refrigerators to improve the in-flight dining experiences [6]. This enables frozen complete meals to be kept in cold storage before they are reheated in the electric ovens prior to being served to the passengers, increasing variety of meal options that can be made available in flight.

Nowadays, most airlines are using similar method in providing their in-flight meal services, which is by means of service trolleys or carts. These trolleys are utilized to transport the food and beverages along the aisle inside the cabin. Food and beverages are prepared in the galley area before being carted on the service trolleys by the flight attendants to be distributed to the passengers. Once the passengers have finished their meals after the allocated time frame, the flight attendants will make another round inside the cabin with the service trolleys to collect the meal trays and waste. More often than not, the flight attendants will have to do few extra rounds with plastic bags or trays to collect the waste from the passengers. The waste collection service is therefore closely linked to the in-flight meal services. Overall, this general process is summarized in Figure 1.

![Figure 1. General in-flight food delivery and waste collection process](image)

Similar service trolley is typically used in aircraft today, which is about 0.3m wide, 1m tall, 0.75m long and it weighs around 25kg (unladen). This is shown in Figure 2. The minimum number of cabin crew needed for a typical narrow-bodied plane is three while for a wide-bodied aircraft is 10. For some airlines, they have as many as six flight attendants on their 737s and 14 on A340s. Usually two flight attendants work together for a single service trolley in delivering food and beverages to passengers at a designated time during the flight, with the one who is pulling the trolley will hand out food while the other one who is pushing the trolley will hand out beverages.
There have also been some issues regarding this current in-flight food delivery and waste collection process. Among the common complaints are related to the long waiting time for service and also the inefficiency of the delivery and collection procedures. For instance, some passengers have to wait long for the meals because the flight attendants are serving the other rows first and sometimes, especially due to unfavourable flying conditions, the flight attendants do not have sufficient time to serve all of the passengers on short haul flights. Apart from these, during the food delivery and waste collection process, the serving cart is blocking the aisle and this makes it difficult for passengers who want to use the lavatory. Several other issues regarding the current service method are highlighted in later section based on the conducted public survey. Having highlighted some of the ongoing issues regarding the current general method used for in-flight food delivery and waste collection process, the next section will further discuss the passengers' perception and potential improvement that can be applied to this current method.

![Figure 2](image)

**Figure 2.** Typical service trolley dimensions [8]

3. **The passenger survey**
A questionnaire has been posted online to establish the general perception of flying passengers with regards to current method used for in-flight food delivery and waste collection services. In total, 174 people have responded to the online survey, which is comprised of questions related to their general personal and social background, flying experiences and also their comments and suggestions regarding the current in-flight food delivery and waste collection method. For this public survey, the experiences of the respondents can be from both short-haul and long-haul flights.

Of the total 174 respondents, 71% of them are female while the rest are male. Majority of them is within the age group of 21-30 years old, which makes up more than 70% of the total respondents. In addition, close to 60% of them often travel by commercial flights more than once per year. The latter characteristic makes the respondents a good sample demographics for this study as they should already have many experiences with in-flight services. Table 1 summarizes the demographic characteristics of the survey respondents in terms of their age, gender and annual income.

### 3.1. Passengers' perception of in-flight food delivery and waste collection
The main objective of airlines offering their in-flight services is to differentiate themselves from other competing airlines by improving their customers' flying experiences. As highlighted by the results of the conducted public survey, an overwhelming more than 90% of the respondents said that they will choose to travel with airlines that offer in-flight meals service if the flight ticket price is the same. This shows that the offering of in-flight meals service does affect the passengers' choice of airlines. In fact, in response to a question on whether they like to be served with drinks or snacks while onboard the aircraft, either for short-haul or long-haul flight, 89% of the respondents gave an affirmative answer.
Table 1. Sample demographics

| Demographic characteristics | Frequency | Percent (%) |
|-----------------------------|-----------|-------------|
| **Gender**                  |           |             |
| Male                        | 51        | 29          |
| Female                      | 123       | 71          |
| **Age**                     |           |             |
| Under 20                    | 5         | 3           |
| 21 - 30                     | 124       | 71          |
| 31 - 40                     | 29        | 17          |
| 41 - 50                     | 12        | 7           |
| Above 50                    | 4         | 2           |
| **Monthly income (RM)**     |           |             |
| No specific income (student)| 30        | 17          |
| Below 1000                  | 5         | 3           |
| 1001 - 3000                 | 62        | 36          |
| 3001 - 5000                 | 44        | 25          |
| Above 5000                  | 33        | 19          |
| **Total**                   | 174       | 100         |

Figure 3 illustrates how the survey respondents rated the different factors that they consider when choosing airlines for travel. The rating is on a scale of 1 to 5, with 1 being the least important factor that they consider while 5 refers to the most important factor. As can be expected, flight ticket price has the highest rated importance with an average rating of 4.1, followed by the flight schedule and the airlines' service reliability and punctuality track records with an average rating of 4.0 and 3.9, respectively. Meanwhile, in-flight meal service is rated as 3.5 on average and hence can be taken to be of notable significance in relative to the other considered factors. Even though in-flight food delivery and waste collection service is not the most influential feature to be considered by most passengers while selecting their choice of airline for travel, it could still be the deciding factor. This is because in-flight meal service has a big impact on overall airline's service quality since it is directly provided to
passengers through interactive encounters and occupies the largest amount of flight attendants' time with them [5]. As also argued in [6], experiences related to in-flight meal service can invoke emotional sentiments to the passengers and this can become a major factor for repeat customers. It should be noted that the questionnaire does not specify whether the selection factors are for short-haul or long-haul flights. It is believed that the factors may be rated slightly different if the type of flights has been specified. For instance, cabin comfort is expected to be rated much higher if the survey respondents are focused only on long-haul flights.

From the collected survey data, only 40% of the respondents considered the current in-flight food delivery and waste collection service to be efficient. On the other hand, almost half of the respondents felt that the service can be further improved. The respondents were asked to rate the current service in terms of eight performance characteristics as shown in Figure 4. Similar 1-to-5 rating scale is applied here, whereby a rating of 1 means that the current service is at the lowest level for the performance aspect while a rating of 5 corresponds to the current service being at the best level. Interestingly, the worst rated performance criterion is passengers' privacy, which primarily corresponds to the feeling that their privacy is disturbed when the flight attendants are serving other passengers in the same or nearby rows where they are seated. Furthermore, the respondents have also complained about the level of comfort and accident likelihood for the current in-flight food delivery and waste collection method. Nonetheless, it can be taken that most passengers are generally satisfied with the current service and this is reflected by the average rating of more than 3 for all of the measured performance criteria.

![Figure 4. Performance ratings of current in-flight food delivery and waste collection service](image)

Table 2 details out some of the negative experiences that the respondents had during their previous flight trips related to in-flight food delivery and waste collection service. It appears that the biggest comment made by the surveyed respondents is service waiting time. Depending on the rows that the passengers are seated, the waiting time can be different. More than 47% of the respondents stated that they had to wait more than 10 minutes on average for the service after it is started, which is a crucial factor when they were flying short haul flights. Secondly, in line with the rating results in figure 3 for passengers' privacy, many passengers felt that they were disturbed by the serving process, especially when they were skipping meals and wished to rest at their seat without being bothered. The situation is worse if the passenger is seated in the aisle or middle seat of the row since the service interaction with other passengers will have to go through his or her space. Other significant feedbacks from the public
respondents also include missing their preferred meal options due to being serviced late and also late service by the flight attendants due to flight turbulence.

Table 2. Negative experiences regarding in-flight food delivery and waste collection service

| Scenario                                                                 | Percent (%) |
|--------------------------------------------------------------------------|-------------|
| The flight attendants could not serve your meals on-time because of flight turbulence. | 28          |
| The flight attendants served only some of the passengers since they did not have enough time to serve all passengers due to unfavourable flight conditions. | 12          |
| You had to wait long for your meals because the flight attendants started serving in other rows first. | 48          |
| There were incidents during the meal serving process such as spilled hot foods/drinks. | 10          |
| You were disturbed during your rest because other passengers in your row were being served (which you skipped to have your rest) or having their waste collected by the flight attendants. | 40          |
| You were forced to eat at the required time of meal serving even though you prefer to have it earlier or later. | 20          |
| You cannot rest comfortably after your meal because of the long wait for the flight attendants to collect the waste. | 22          |
| You had to wait to use the lavatory because the service cart was blocking the aisle during the meal serving and waste collection process. | 25          |
| The meal option that you wanted was no longer available because you were among the last passengers to be served. | 30          |

3.2. Potential improvement of the service

With the comments regarding current in-flight food delivery and waste collection service method, the respondents were also asked several questions on the potential improvement that they would like to see implemented to the service. About 66% believe that it is more important for them to have a very efficient in-flight service instead of having plenty in-flight meal options. This indicates that the quality of service (including the quality of the food served although with limited choices) is more imperative to the passengers. For short haul flights, in which time to serve food and collect the waste afterwards is much more critical, more than 82% of the surveyed respondents were satisfied with only light meals or snacks.

When asked for their opinion on possible implementation of an automated food delivery and waste collection system onboard the aircraft in the future to make the in-flight service more efficient, 66% of the respondents agreed that it would be a great improvement effort. Only 4% were strictly against the idea since they prefer the current service method while the rest were either neutral or undecided about this revolutionary idea. Table 3 tabulates the importance rating given by the respondents for several characteristics of a new system that could improve the current in-flight service. A similar 1-to-5 rating scale is applied here, whereby a rating of 1 means that the criterion is the least important while a rating of 5 corresponds to the most important for the respondents. As can be observed from table 3, the most important factor for the passengers is safety. Improvement of the service should not expose passengers to higher accidental risk than the current method. In addition, once again the passengers' privacy issue is emphasized by the respondents with a high importance rating given on the system's capability to deliver the intended functions without disturbing other passengers.

There are indeed several inventions that have been developed for improving the food delivery and waste collection process, although none of them has made it to mass utilization onboard commercial
transport aircraft. In fact, one of the earliest innovations to automate the process has been invented in 1965 by Martin Umanoff [9]. He has filed the patent of a cabinet that can move by guided cable along the aisle. The cabinet is capable of carrying a large number of separate meal trays such that in-flight meals maybe dispensed one after another. The main goal of this invention is to reduce the length of serving time and eliminate the frequent trips to the galley by the stewardess. However, the primary weaknesses of this machine are its added weight and the fact that it is still blocking the aisle during its operation. On the other hand, a recent patent filing of an automated device that can transfer meals to passengers and remove the waste is an encouraging development in improving the in-flight services.

The patent describes a transport passage associated with an automated galley that is placed below the cabin floor and transports the food to the passenger cabin [10]. However, the foods and drinks that are delivered by this system still require the passengers to pass it among them in the same row.

### Table 3. Importance rating of criteria for improvement

| Characteristics                                                                 | Rating |
|---------------------------------------------------------------------------------|--------|
| The system should be able to serve food at passengers' own leisure and not a fixed time. | 3.18   |
| The system should be able to deliver the food almost immediately after the passengers' request. | 3.42   |
| The system should be able to collect the waste at the passengers' own leisure and not at a fixed time. | 3.43   |
| The system should be able to deliver the food and collect the waste without discomforting other passengers. | 3.72   |
| The system should be designed for passengers' safety use by reducing the accidental risk. | 3.88   |

4. Conclusion

Based on the results of the conducted online public survey, several conclusions regarding the in-flight food delivery and waste collection service can be drawn. It has been indicated that the service has an impact on the passengers' choice of airlines for their travel plan, which is reflected by its high rating from the survey respondents. However, the majority of respondents also points out that there are some improvements needed to increase the efficiency of current in-flight food delivery and waste collection service. The survey results highlight several potential process enhancements that could be made from the importance rating of the service criteria by the respondents. All in all, the information obtained from this survey study can be applied to either improve the current service or develop a new system for in-flight food delivery and waste collection process.

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