



## **Assessing HN Airlines Pet Consignment Service using the Analytic Hierarchy Process and Fuzzy integrated evaluation**

Hailin Gan

Haaga-Helia University of Applied Sciences

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## Abstract

<b>Author(s)</b> Hailin Gan
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<p>The pet check-in business is not a boom in China, and many consumers do not even actively choose to check in their pets by air. The research question in this paper is to investigate the status of the service quality evaluation of HN Airlines' pet consignment business and to improve the service quality based on the results of the survey. The results of this study will help me to objectively determine the level of consumer satisfaction with HN Air's pet consignment service and the level of demand for this service in China. HN Airlines is the most developed airline in China when it comes to the pet consignment business. The shortcomings identified through the survey of HN Airlines' pet consignment business are likely to be similar to those of other airlines in China, while what it does well will allow more airlines to learn from each other and accelerate the maturity and professionalism of China's pet consignment business. In this paper, we will use hierarchical analysis to obtain the weight ratios of each dimensional indicator, design a questionnaire to evaluate the service quality of HN Airlines' pet consignment business, take consumers with pet consignment needs as the respondents, and obtain the final results through fuzzy comprehensive evaluation method. Finally, a customer journey map was used to suggest improvements to HN Air's pet consignment business.</p>
<b>Key words</b> Pet air freight service quality evaluation, SERVQUAL evaluation model indicators, expert scoring method, questionnaire, AHP analysis, Fuzzy integrated evaluation method, customer journey map

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# 1 Introduction

For the service quality evaluation of the HN airline pet consignment business, this chapter will first introduce the overall research idea of the thesis, and then explain the background information on the topic such as the development potential of the Chinese pet air logistics market. It will then explain the research objectives and the research questions focused on the service quality evaluation of HN airline pet consignment business, as well as the theoretical and practical implications of the study. Finally the research methodology that will be used and the methods for collecting the relevant data required will be presented.

## 1.1 Overlay matrix

Table 1 overlay matrix

General research questions	Investigative questions	Theoretical framework (chapter)	Results (chapter)	Questionnaire questions
Investigate the status of service quality evaluation of HN Air's pet consignment operations and improve service quality based on the findings.	How do customers rate the rules and regulations of pet consignments?	2.1.1	5.1.2	5
	What do customers say about infrastructure such as crates for pet airfreight?	2.2.1	5.1.1	1, 2
	What do customers say about the service design aspect of the air freight process for pets?	2.3.1	5.1.1, 5.1.3, 5.1.4, 5.1.5	3, 4, 6-18

## 1.2 Research flow chart

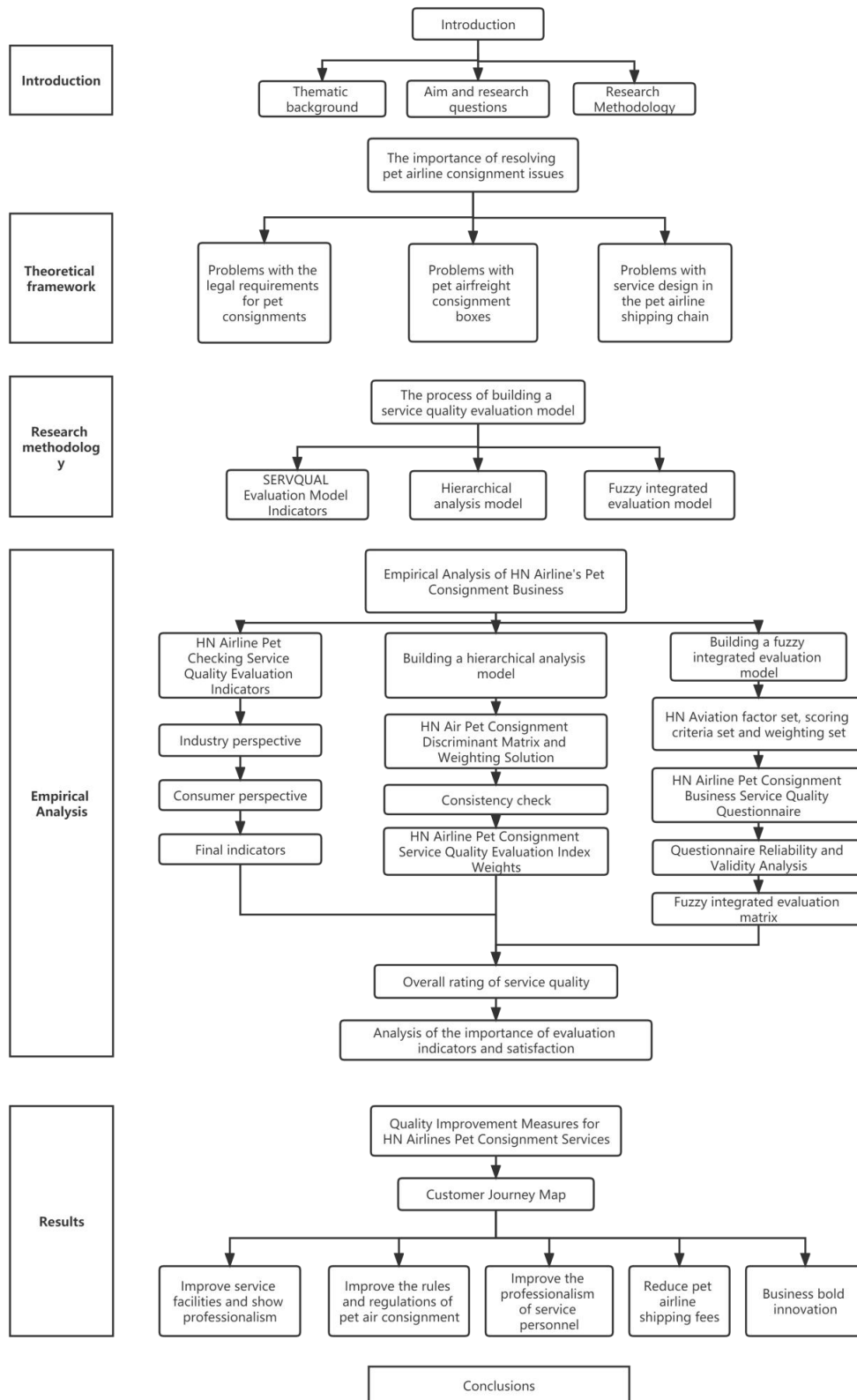


Figure 1 Flow chart of research ideas

### 1.3 Thematic background

According to statistics in China, dogs and cats will continue to be the most popular type of pet among pet owners in 2022. The number of dogs and cats in urban areas is 116.55 million, an increase of 3.7% compared to 2021. Of these, the number of dogs is 51.19 million, accounting for 51.3%, down 5.7% from 2021 and back to 2020 levels, while the number of cats is 65.36 million, accounting for 60.7%, in a continuing upward trend, up 12.6% from 2021, a record high number.

In 2022, the urban pet consumption market size is 270.6 billion yuan, up 8.7% from 2021, an increase of 8.7%. Of these, the dog consumption market size slows down from 2021, growing by 3.1%, while the cat market size continues to grow steadily, increasing by 16.1% from 2021, as shown in Figure 2. (Pai, 2023)

As sales in the pet market continue to rise, the industry's development potential is gradually increasing and the pet industry is expected to remain on a steady upward trend in the future. With the development of economic globalisation and the improvement of people's living standards, the demand for pet owners to travel with their pets or to check in their pets has also increased significantly, and major airlines have begun to pay attention to pet transportation services.

Although pet air logistics in China currently accounts for a relatively small proportion of the overall logistics market, pets have now become an important spiritual and emotional support for people, so the future of the pet air logistics market is very bright. Some scholars have focused on how to operate a pet economy under the influence of the Internet tide and have given relevant strategies. At the same time, the importance of pet air consignment in improving the service chain has been emphasised. (Jian, 2021) This certainly emphasises the focus on the development of the pet air consignment business as a major trend for the future.

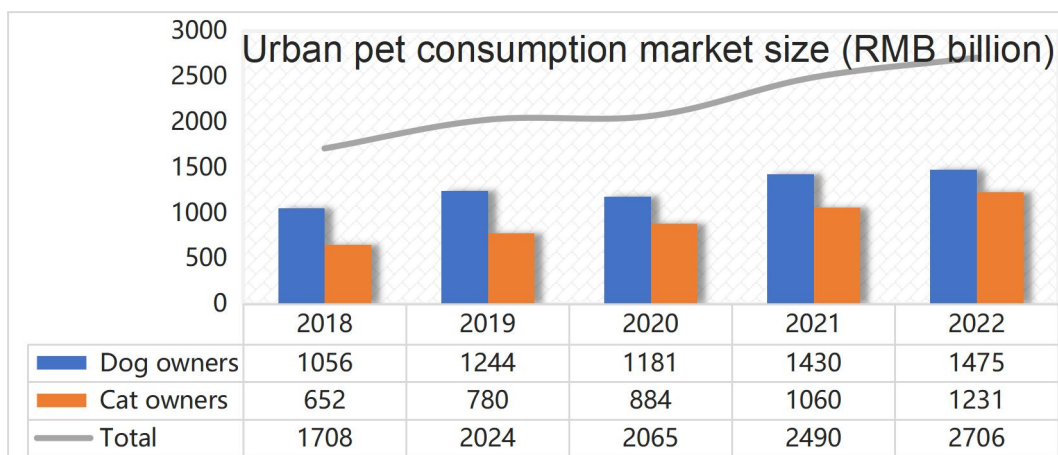


Figure 2 China Urban Pet Consumption Market Size Statistics 2018-2022 (Data from China Pet Industry White Paper - China Pet Consumption Report 2022)

## **1.4 Aim and research questions**

With the gradual rise of the "pet fever", people's demand for pet transportation has increased, promoting the rapid development of pet logistics in China, but also exposing the many problems that exist in China's pet logistics. (Jin, 2022) Meanwhile pet air consignment should have been the highest priority among pet consignment methods, but most Chinese consumers have linked pet air consignment with unsafe and other risk factors in their subjective impressions.

The objective of this study is to conduct a survey of people who have actually experienced pet shipping, and to obtain the most realistic results of Chinese consumers' demand and service quality for pet shipping. HN Airlines will be used as the main case study and analysis target. The research question of this paper is to investigate the status of service quality evaluation of HN Airlines' pet consignment business.

### **1.4.1 Survey process**

Based on the results of the service quality evaluation of HN Airlines' pet shipping business, recommendations will be made to improve the service quality of HN Airlines' pet shipping business. To this end, it is necessary to identify the dimensional indicators suitable for conducting a pet air freight service quality survey through the dimensional thinking approach of the SERVQUAL model and the relevant literature on pet air freight. The weights of each dimensional indicator were obtained through questionnaire survey, expert scoring and hierarchical analysis. The results of the service satisfaction survey of HN Air's pet airfreight consignment business were obtained by questionnaire survey and fuzzy comprehensive evaluation method. The customer journey map was used to demonstrate the difference between before and after the improvement of HN Airline's pet consignment business. Complete the research on the topic of investigation and improvement of the service quality evaluation of HN Airlines pet consignment business.

### **1.4.2 Theoretical and practical implications**

In terms of theoretical significance, it provides a reference for other service providers in the pet air logistics industry to evaluate and improve their service quality, and also provides a reference for the study of pet consignment in civil aviation.

In terms of practical application, the study proposed by the authors aims to address the ambiguity of service quality in the current study of civil aviation pet consignment service providers, and can effectively capture the experts' judgement of the importance of current air pet consignment industry indicators, the current consumer evaluation of HN Air pet consignment service providers' services, and the specific directions of change that HN Air can make. This will prevent HN Air from wasting



human and material resources on unnecessary aspects and failing to solve business problems in a timely manner, thus adversely affecting HN Air's brand image. At this stage, there is little difference in passenger services between airlines of the same type, and consumers with pet airline shipping needs will use the pet airline shipping business as a decisive factor when choosing an airline. Our proposed methodology can also pinpoint the shortcomings of HN Air's pet check-in service and help HN Air identify areas for improvement in the objective and subjective factors of its pet check-in business, so that it can launch a more competitive pet check-in business in the future and reap more economic and brand benefits.

## **1.5 Research Methodology**

The authors conducted a lot of literature reading and found that there is basically no literature on the business service quality evaluation of pet air consignment service providers at home and abroad. Finally, the authors found that many scholars often investigate and analyse the SERVQUAL model, the hierarchical analysis method model and the fuzzy comprehensive evaluation method model when evaluating the service quality of other traditional logistics transport, and the authors believe that pet air consignment has commonalities with traditional logistics transport methods.

Therefore, the authors considered how to apply these three models to assess service quality in the case of HN Airlines based on the characteristics of the pet consignment business of the pet airline, where the data related to the hierarchical analysis method and the data related to the fuzzy comprehensive evaluation method, both of which required the use of questionnaires for expert scoring questionnaires and service quality evaluation scoring questionnaires to be created for the survey, and finally proved the business optimisation of HN Airlines after proposing business improvement measures through customer journey maps.

### **1.5.1 SERVQUAL Evaluation Model Indicators**

The SERVQUAL and SERVPERF scales have had a wide impact on various industries when conducting service quality and consumer satisfaction surveys. In "Service Quality Evaluation of Xi'an Yuan Tong Express Based on SERVQUAL-IPA Model", a scholar once combined the traditional five evaluation dimensions in the SERVQUAL scale with the characteristics of express services and relevant regulations and norms, and eventually proposed six evaluation dimensions to meet the evaluation of Yuan Tong Express, effectively compensating for the singularity of the SERVQUAL scale in evaluating service gaps through IPA only . (Jia, 2019)

Constructing a multi-level evaluation index system to study mainline railway transport services in the "Research on service quality of railway pick-up and drop-off stations". (Wang, 2018)

Designing multimodal transport evaluation index system from 3 aspects in "Research on the construction of container multimodal transport efficiency evaluation index system". (Zhu, 2018) Such literature presents different thoughts on the evaluation system in terms of the dimensions and elemental composition of service quality.

In some scholars' research on air-ground logistics service quality evaluation model taking the Capital International Airport as an example, the initial evaluation system was first designed using SERVQUAL scale and KANO model, then revised by exploratory factor analysis, and finally the FAHP method was used to conduct a comprehensive evaluation of the operation in combination with the example of Capital International Airport. (Tian, 2018)

There is also the SERVQUAL model based on PZB, which constructs an aviation service quality evaluation scale from the perspective of customer perception, further extending and applying the research on service quality evaluation, providing an effective tool and method for the domestic aviation industry to improve its service level and industry competitiveness. (Wang, 2013)

Some scholars have constructed technical dimensions of air cargo service quality based on the characteristics of air cargo services, combining internal service quality techniques and external customer service requirements. (Chao, 2013)

Other scholars have proposed a supplier selection model using the AHP method with detailed sensitivity analysis, which is more suitable for the establishment of indicators of unstable business dimensions. (Vinod, 2016)

Therefore, in this paper, we will start from the five initial dimensions of the SERVQUAL evaluation model and combine them with the characteristics of airline pet consignment services to identify some of the dimensions to be considered from the consumer's perspective for this topic. The remaining dimensions to be considered from an industry perspective will be determined by reading the extensive literature related to airline pet shipping. A set of questionnaires was designed based on the summarised dimensions and indicators, and staff engaged in the relevant business areas were used as respondents to find out how important the professionals were to each segment and to complete expert scoring.

### **1.5.2 Questionnaire method**

The questionnaire is designed according to the content of the research questions to be studied, the questionnaires are distributed and collected for the target group related to the research, then the collected questionnaires are tested for reliability and validity, and finally the data are collated and analysed.

### **1.5.3 Hierarchical analysis and fuzzy integrated evaluation method**

As the evaluation of air logistics competitiveness is characterised by fuzzy and multi-attributes, the use of hierarchical analysis and fuzzy comprehensive evaluation method is a good choice.

Some scholars have used the weighting method model of evaluation indexes to construct subjective and objective assignment methods respectively and a comprehensive evaluation model to find out the final evaluation value in "Research on the evaluation system of aviation logistics based on sustainable development". (Huang, 2017)

Scholars have used Guangxi Guilin Liangjiang Airport, Nanning Wuxu International Airport and Shanghai Pudong International Airport as examples for comprehensive analysis to construct a more scientific and comprehensive evaluation model of aviation logistics competitiveness, and put forward strategies to improve logistics competitiveness to ensure that the evaluation model can effectively measure aviation logistics competitiveness. (Zhang, 2016)

Other scholars transformed the comprehensive evaluation of the aviation military logistics transportation control system into a simple evaluation model with a mathematical basis through the combination of fuzzy and AHP (An, 2010).

The authors will obtain the weight ratio of each dimensional index through hierarchical analysis, and then design a questionnaire to evaluate the service quality of HN airline pet consignment business, and take consumers with pet consignment needs as the respondents to understand consumers' expectation and satisfaction of each aspect of HN airline pet consignment business at this stage, and after completing the above aspects, the final results can be obtained through fuzzy comprehensive evaluation method. Based on the analysis results, improvement suggestions can be made to HN Air's pet consignment business and a customer journey map of HN Air's pet consignment business can be established to prove the feasibility of the improvement method and the optimisation of the business after the improvement.

### **1.5.4 Customer Journey Map**

A customer journey map can show the consumer's journey from the first contact with a service, through each service touchpoint of contact with the service, to the final conclusion of the service. It can be used to show the story of the consumer's experience in a given scenario. It also provides a clear picture of the interaction between the consumer and the product and service. By observing and analysing the actions, thoughts and feelings of the user at each stage of receiving the service, it helps to optimise the service process and solve the pain points of the product.

The author will develop a customer journey map for HN Airlines' pet shipping business and propose focused improvements based on the results of the three models, and will combine the customer journey map to optimise the service process and improve the quality of service for HN Airlines' pet shipping business.

## **2 The importance of resolving pet airline consignment issues**

According to a literature survey, the three aspects of pet shipping laws and regulations, the pet air shipping service system and the safety risks of the shipping chain are the most frequently discussed by the public in China's pet air consignment business. This chapter will illustrate the need for this study from these three aspects, taking into account their corresponding existing issues and the research results of previous scholars on the corresponding hot issues. This will lead to a better understanding of the current situation of the pet air shipping business in China.

### **2.1 Problems with the legal requirements for pet consignments**

A study on the establishment and improvement of the legal and regulatory framework for pet transportation. Pet insurance is still in its infancy in China, with a single product structure and few types of insurance, including pet medical insurance, pet third party liability insurance, comprehensive pet insurance and transport insurance. This has also led to imperfections in relevant laws and regulations, and the guaranteed nature of the consignment is limited.

Due to the complexity of pets in transit, few companies offer pet transport insurance and airlines do not provide pet insurance services. It is usually professional pet logistics companies that work with insurance companies to provide this product, so the professionalism of consignments is limited.

There are high requirements for pet transport insurance: pets must be healthy, vaccinated and generally over 2.5 months of age, older pets and pregnant pets do not qualify for pet transport insurance and there are restrictions on the value of insurance for short-nosed pets. This makes the construction of relevant laws and regulations more complex.

#### **2.1.1 Summary and analysis of previous studies**

In "Airline attempts to carry pets in the cabin" it is noted that many domestic airline pet consignment service providers are required to sign waiver agreements with consumers when conducting consignment business, and many domestic airlines stipulate in their agreements that consumers are fully responsible for pet injuries and deaths, except for the reasons of the service provider, so when accidents occur, there is less information due to the lack of transparency in the pet consignment process, and consumers are disadvantaged position when defending consumer rights and holding service providers accountable (Zhu, 2019). This leads to the problem of poorly constructed laws and regulations being infinitely magnified.

At the same time numerous scholars have made suggestions on this issue. Corresponding suggestions were also made in "Analysis of the problems and countermeasures existing in China's

pet air transport", involving imperfect laws and regulations, inadequate transport facilities and systems (Xu, 2018)

In "Differences in the existence of domestic and foreign pet consignment", it is similarly mentioned that foreign pet air consignment industries are more complete in terms of both regulations and service systems, and have accumulated rich experience in how to carry out pet air consignment, which is well worth studying and learning from domestic airlines. (Guo, 2017)

## **2.2 Problems with pet airfreight consignment boxes**

In terms of the improvement and design of the pet air transport service system, particular attention should be paid to the crates for pet transport. In pet transport, consideration must be given not only to ventilation, feeding, drinking water and space, but also to the ease and stability of escape, sorting and loading and unloading of pets, as well as to the contamination of excrement.

As a result, carriers have very high requirements for packaging and shippers need to be very careful when choosing pet packaging. The main types of pet packaging used in transport are pet crates, pet cages, pet trolley boxes and animal containers. Whichever form of packaging is used, it is important to ensure the normal survival of the pet while not affecting others.

At present, there are still many problems with pet packaging on the market: for example, the degree of resistance to pressure and sturdiness still needs to be improved, and pets escape from time to time; the eating and drinking functions are not perfect, and pets cannot eat and drink normally as they do at home; the transport environment is usually dark, which tends to affect the mood of pets; for example, the practical application of real-time physiological monitoring is relatively small, and pet owners cannot know the status of their pets in real time. The professionalism, assurance and empathy of consignment are limited.

In recent years, although designs for portable kennels and multifunctional pet logistics boxes have emerged, they are more costly and technically demanding and have not yet been widely used, which has led to the economics of consignment being limited as well.

### **2.2.1 Summary and analysis of previous studies**

As a result, many experts and scholars have conducted research in this direction. In "Research on the design of pet logistics air crates based on service design thinking", the focus is on combining service design thinking patterns into the design of pet air crates, while proposing a new approach to pet air crate design based on consumer demand for various aspects of pet air consignment as a way to improve the service aspect. (Jiang, 2022)

In "Research on the design of intelligent transport pet crates based on user experience", some scholars designed an intelligent transport pet crate based on small dogs and cats, combined with IoT-related technologies, aiming to solve the safety problems in pet air transportation. (Yang, 2020)

### **2.3 Problems with service design in the pet airline shipping chain**

The pet logistics market in China is relatively chaotic in terms of service design in the pet airfreight consignment segment. The lack of market supervision in the pet logistics industry has led to many safety hazards in the consignment segment. This has led to restrictions on the assurance of consignments.

In addition to this, there is a low level of awareness of pet logistics. Many customers do not understand pet logistics and choose a third party agent through internet information, but most of the information on the internet is advertising and its authenticity is yet to be verified. Many unqualified companies still take orders online and the related procedures are very cumbersome and the response rate is very low. This has led to restrictions on the professionalism and responsiveness of consignments.

At the same time, due to frequent accidents during transportation, some potential customers are also reluctant to pay attention to the pet consignment services of various airlines, and airlines are affected by this and devote more human and material resources to other business segments, which leads to the limitation of the diversity of consignment business.

At the same time, the transportation process of pet air consignments lacks protection. In recent years, incidents of pet consignments in transit have occurred frequently. For example, staff of pet consignment companies have used company channels to take orders privately and have privately changed from air to land transport, leading to tragedies.

The root cause of this is the shipper's inability to keep up to date with the pet's latest developments and the low level of information sharing, giving the carrier the opportunity to operate privately. After signing a transport contract, most shippers contact pet logistics companies via WeChat to obtain the current status of their pets, but there are many pitfalls to this reliance on a trusting relationship. On the one hand, the carrier has a large number of pets to transport and does not have enough time and energy to respond to the shipper in a timely manner; on the other hand, the shipper can only understand the pet's situation through the carrier's words and is unable to react in case of an emergency or even understand the actual situation, which is the biggest concern for many pet owners. The professionalism, assurance, responsiveness and empathy of the consignment are all limited. This all greatly affects the development of the domestic pet air consignment business.

### 2.3.1 Summary and analysis of previous studies

In the design of the IoT-based pet logistics service system, some scholars acknowledge that the current stage of pet consignment business in China is prone to pet injuries, loss and death, as well as the trend of increasing transportation costs year by year, which is highly consistent with the current situation of domestic pet air consignment service providers, and belongs to the more traditional crude transportation route management, while foreign countries have long been moving towards a more information-based pet logistics service platform. This is highly consistent with the current situation of the various domestic pet air freight service providers, which is more traditional in terms of crude transport route management, while foreign countries have long moved towards a more information-based pet logistics service platform. (Wei, 2019)

Chinese airlines have been seeking changes to address this issue. As mentioned in "China Southern Airlines upgrades pet check-in service", the airline has optimised its service links from the consumer's perspective to better meet the personalised and convenient service requirements of travelling with pets. (Wu, 2022)

Many scholars have given their thoughts on such issues. Some scholars have proposed a design concept based on the STM32 microcontroller in the design of smart pet wearable devices, which provides a solution for the transparency of the airline pet consignment process, using GPS and GPRS for long-distance positioning and Bluetooth for near-distance positioning to obtain information, thus realizing the whole positioning of the pet. (Liu, 2017)

Some scholars, on the other hand, in "Research on the development of pet logistics and its operation mode", used the chart method to organize the links of pet logistics business and the operation process of service providers, and proposed measures such as establishing professional pet logistics companies, cooperation between third-party logistics and pet enterprises, and joint operation of pet enterprises in response to the problems existing in the operation of pet logistics at the present stage. (Cheng, 2017)

Other scholars, in "Analysis of the Development of Pet Logistics in China", analyzed the current situation of the domestic pet logistics market and proposed measures to improve the pet logistics management system, improve the level of informationization of the logistics system, cultivate high-quality logistics talents and improve the pet logistics system in response to the existing problems. (Pan, 2016)



### **3 The process of building a service quality evaluation model**

This chapter will introduce how to carry out the establishment of a service quality evaluation model to help better understand the process of constructing SERVQUAL model indicators, hierarchical analysis method model and fuzzy comprehensive evaluation method model, and to understand the correlation between the three model methods.

#### **3.1 SERVQUAL Evaluation Model Indicators**

This section will start by reading the literature on pet airline shipping and by looking at the five dimensional indicators that already exist in the SERVQUAL model approach. The dimensional indicators for the service quality evaluation targets investigated in this final thesis are carried out from the perspective of industry and consumers respectively.

#### **3.2 Hierarchical analysis model**

This section requires the establishment of the weights of the service quality evaluation indicators first. At the same time, on this basis, the proportional scaling method and the results of the expert scoring questionnaire produced are combined to construct the discriminant matrix of the service evaluation indicators and solve for the weights to finally complete the establishment of the evaluation indicator weights.

##### **3.2.1 Indicator weights for service quality evaluation**

The size of the weights is the proportional size of all the indicators we have chosen in the overall objective, and the set of weights is also a collection of relationships based on the importance of each indicator in this overall. A weight set is a set of relationships based on the importance of different indicators in the overall. Each indicator weight represents the level of importance in the overall objective and helps the author to assess its importance and impact. At the same time it is at the same level the sum of the weights of all indicators is equal to 1. Indicators at the same level can also be broken down into a number of secondary indicators, and the sum of the weights of all secondary indicators under the same indicator is also equal to 1. It is also important to note that weights have a strong guiding role and that high weights are of high importance.

##### **3.2.2 Ratio Scaling**

Ratio scaling is a method of scaling the intensity of stimuli perceived by the human senses through relative ratios. This method assumes a linear relationship between the subjective stimulus intensity and the value. The method for determining ratio scaling is shown in Table 2.

Table 2 Ratio scale method (Data is model fixed content)

Scale	Meaning
1	Indicator A is more important than B when compared to both indicators
3	Indicator A is marginally more important than B
5	Indicator A is significantly more important than B
7	As an indicator, A is more strongly important than B
9	A is more important than B when compared to both indicators
2, 4, 6, 8	Scale values for intermediate states between the above judgements
Countdown	Performance indicators for B over A

Table 3 RI taken for matrix orders 3 to 16 (Data is model fixed content)

Random Consistency RI Table

n order	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RI value	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54	1.56	1.58	1.59	1.5943
n order	17	18	19	20	21	22	23	24	25	26	27	28	29	30
RI value	1.6064	1.6133	1.6207	1.6292	1.6358	1.6403	1.6462	1.6497	1.6556	1.6587	1.6631	1.667	1.6693	1.6724

RI=0 for n=1,2 in the table, as the positive reciprocal inverse matrix of order 1,2 is always a consistent array, so it is not marked in the table 3.

### 3.2.3 Construction of the discriminant matrix and solution of the weights

Based on the summarised indicators of the survey respondents and using the scale method described above, we first use the expert consultation method, which generally requires the selection of at least five experts and academics in the survey field to rate the criticality of the indicators, and then conduct internal discussions and summaries based on the results of the ratings, resulting in a two-by-two discriminant matrix.

### 3.2.4 Consistency check

Three formulae are needed to complete this section.

$$\lambda_{\max} = \sum_{i=1}^n \frac{[UW]_i}{nw_i}$$

The first equation is:

The purpose of this formula is to calculate the maximum eigenvector  $\lambda_{\max}$ . The U in the formula represents each of the judgement matrices listed in the previous section and the W is the eigenvector of the matrix.

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

The second equation is:

The purpose of the second formula is to derive the consistency index CI,  $\lambda_{\max}$  can be calculated from the first formula, where n represents the order of the matrix, to complete the calculation.

$$CR = \frac{CI}{RI}$$

The third equation is:

The purpose of the third formula is to calculate the consistency ratio CR. CI can be derived from the second formula, while the specific value of RI can be found from the previous Table 3 based on the order of the matrix, and the calculation can be completed.

When the final CR result is less than 0.1, we can be sure that the construction of the matrix is reasonable.

Once the above has been completed, the weights of each indicator can be found by applying the hierarchical analysis method to each indicator. The consistency check is calculated by repeating

the construction of the judgment matrix  $S = (u_{ij})_{p \times p}$ .

Finally the weights of the evaluation indicators for all the matrices constructed are summarised and more easily viewed.

### 3.3 Fuzzy integrated evaluation model

In this section, we will combine the already constructed service quality evaluation system and the indicator weights obtained from the survey with the data from the distributed and returned questionnaires, and apply the fuzzy comprehensive evaluation method to evaluate the service level

of the survey respondents. But before that, we need to form the set of evaluation factors, the set of comments and the set of weights corresponding to the service quality evaluation conducted by the survey respondents.

### 3.3.1 Factoristic domain

The first step is to first determine the domain of factors to be evaluated: there can be  $P$  evaluation indicators that  $U = \{u_1, u_2, \dots, u_p\}$

### 3.3.2 Commentary Grade Theory Domain

The second step is to determine the domain of the rubric level: set  $V = \{v_1, v_2, \dots, v_p\}$ , each level can correspond to a fuzzy subset, the level set.

### 3.3.3 Fuzzy relationship matrix

The third step is to establish a fuzzy relationship matrix: after the level fuzzy subset has been established, each factor  $u_i = (i = 1, 2, \dots, p)$  in the evaluated target and object is further quantified to establish the affiliation of the evaluated event to the level fuzzy subset from a single cause  $(R|u_i)$ , In this way, you can get a fuzzy relationship matrix, as follows.

$$R = \begin{bmatrix} R|u_1 \\ R|u_2 \\ \dots \\ R|u_p \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{bmatrix}$$

Among them, line  $i$ - $j$  row element  $r_{ij}$ , It represents the affiliation of a certain evaluation  $u_i$ . From the perspective of the factors, it is affiliated with the  $V_j$  blurred subset of the  $V_j$ .

### 3.3.4 Weight vectors of evaluation factors

The fourth step, determine the right vector of the evaluation factors: In the fuzzy comprehensive assessment scheme, the right vector formula that determines the various factors to evaluate the various factors is  $W = \{a_1, a_2, \dots, a_p\}$ . Generally, the comparative importance order between the evaluation index system is established through hierarchical analysis. You can specify the authority coefficient and regulate it before the combination.

### 3.3.5 Fuzzy integrated evaluation result vector

The fifth step, the synthetic vague comprehensive evaluation results vector: synthesize  $W$  with the  $R$  of each evaluation, and obtain the fuzzy comprehensive evaluation vector  $B$  of each evaluation thing  $B$ .

$$B = W^*R = (a_1, a_2, \dots, a_p) \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{bmatrix} = (b_1, b_2, \dots, b_m)$$

At the same time,  $b_i$  pointed out that the evaluated things are on the whole, the degree of affiliation of  $V_j$  level blurry sub -set.

### 3.3.6 Fuzzy integrated evaluation results vector analysis

The last step is to analyze the vector of the vague comprehensive evaluation results: the more common way of use in practice is the principle of the maximum affiliation, but in some cases, the method of use is too reluctant to use Unreasonable assessment conclusions. A new method of seeking levels through the weighted average is proposed, and multiple evaluated things can be arranged in accordance with their level.

## **4 Empirical Analysis of HN Airline's Pet Consignment Business**

In this chapter, an empirical analysis will be conducted with HN Airlines. The model building process mentioned in the section of Chapter 3 is applied to the evaluation of the quality of HN Air's pet airline consignment service. The study will then be analysed based on the findings.

### **4.1 HN Airline Pet Checking Service Quality Evaluation Indicators**

The determination of dimensional indicators for the service quality evaluation of HN airline pet consignment business was carried out according to the process of determining the SERVQUAL evaluation model indicators in Chapter 3.

#### **4.1.1 Industry perspective**

Firstly, to identify indicators from an industry perspective, we understand based on the content of recent literature in the field of pet air transport. As a special group of pets, timeliness of transport is particularly important. (Xu, 2018)

Among the many modes of transport, air transport has the advantages of short time, fast speed and good transport environment, making it the preferred mode of pet transport. This undoubtedly emphasizes the requirement for professionalism in pet air transport, so the reserve of pet logistics personnel and the use of professional transport equipment will be one of the important criteria for choosing a pet air transport service provider. This is also one of the important criteria for choosing a pet airfreight service provider.

In the past, the diversity of services offered by pet airfreight has been criticised by customers. Pet logistics operations simply transported pets from one airport to another with few additional services such as short-term storage, where customers needed to prepare their own food and water for their pets in transit. (Cheng, 2017)

However, in recent years, several domestic air pet transport service providers have started to introduce more diversified business services, making it necessary to consider the diversity of business as one of the indicators for screening service providers.

#### **4.1.2 Consumer perspective**

Second, from the SERVQUAL evaluation model, the five initial dimensions of SERVQUAL are reliability, responsiveness, assurance, operability and empathy, and the SERVQUAL indicators are determined from the consumer's perspective.

If the original SERVQUAL dimension indicators are completely copied without adjusting the initial SERVQUAL dimensions accordingly, some of the indicators will be less relevant to the actual service items of airline pet consignment, thus reducing the practical value of SERVQUAL.

At the same time, the pet consignment service provided by HN Air is different from ordinary logistics service business, therefore, according to the problems of China's air pet consignment and the characteristics of HN Air's consignment service industry and HN Air's service regulations mentioned in Chapter 2, the SERVQUAL model is fine-tuned to assess the service quality of HN Air's pet consignment service and make up for the service quality deficiencies in a timely manner. A direct and effective service quality improvement strategy was developed.

#### 4.1.3 Final indicators

Finally, we merged "tangibility" and "empathy" into "empathy" based on the two dimensions of professionalism and diversity established by the literature clock, combined with the characteristics of the pet air cargo service industry and the consumer's perspective. Combining "professionalism" and "reliability" into "professionalism" and adding "economy", the final dimensional indicators were defined as The final dimensional indicators were identified as six dimensions: professionalism, responsiveness, economy, empathy, assurance and diversity. Finally, 18 indicators were selected to evaluate the quality of HN's air pet transport services. This is shown in Table 4.

Table 4 HN Airline Pet Consignment Service Quality Level 2 Indicator Setting (Data designed by myself)

Dimensionality	Indicator
Professionalism U1	Customers have access to the latest information on pet consignments U11
	Pets are protected from harm during the shipping process U12
	Pets are shipped in accordance with the customer's requirements and transport plan U13
	Personal information is protected from disclosure U14
	Reasonable compensation and clarity on the cause of injuries sustained during the shipment of pets U15
Responsiveness U2	Service hotline is open U21
	Promptly and effectively handle customer enquiries and complaints U22
Economical U3	Low prices compared to the industry U31

	Pet consignment charges are open, reasonable and transparent U32
	Set fees that are reasonable and uniform compared to the industry U33
Empathic U4	Maintain good communication and care for customer needs U41
	Documentation for pet consignments is simple and easy to understand U42
	Remind customers to prepare documents in accordance with shipping documents U43
Assurance U5	Good image of the airline U51
	Good attitude of service staff U52
	Professional and skilled service staff U53
Diversity U6	More pets can be covered in the pet shipping business category U61
	More additional services available in addition to the basic services U62

## 4.2 Building a hierarchical analysis model

The hierarchical analysis model of HN airline pet consignment business service quality evaluation was constructed according to the process of constructing the hierarchical analysis model in Chapter 3.

### 4.2.1 Expert scoring questionnaire data source

Through the expert scoring method, a total of six industry experts were selected to rate the criticality of the indicators through an expert scoring questionnaire. The six industry experts were: Yang Wenbing, General Manager of Sichuan China Post Logistics Co Ltd, Liao Bing, Director of Chengdu Post Bureau, Sichuan Province, Zhang Tao, Marketing Manager of Sichuan China Post Logistics Co Ltd, Yuan Xi, Marketing Department of Sichuan China Post Logistics Co Ltd, Zheng Dan, Special Logistics Department of Sichuan China Post Logistics Co Ltd and Zhang Liang, Marketing Department of Sichuan China Post Logistics Co Ltd. The questionnaire was distributed during April 2023, and as I was doing an internship in the marketing department of Sichuan CPS Logistics Co. In my opinion, this was the best choice I could have made, and it was only during my internship with the company that I had the opportunity to learn about the processes and information related to the pet air freight business, which helped me write my thesis very effectively.



#### 4.2.2 HN Air Pet Consignment Discriminant Matrix and Weighting Solution

And the following two-by-two discriminant matrix was then internally discussed and summarised based on the scoring results. This is shown in Table 5.

Table 5 Two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data						
	Professionalism U1	Responsiveness U2	Economical U3	Empathic U4	Assurance U5	Diversity U6
Professionalism U1	1	4.536	2.93	4.183	2.551	1.741
Responsiveness U2	0.22	1	0.5	1	0.461	0.315
Economical U3	0.341	2	1	2	0.574	0.488
Empathic U4	0.239	1	0.5	1	0.461	0.341
Assurance U5	0.392	2	1.741	2.169	1	0.53
Diversity U6	0.574	3	2.048	2.766	2	1

#### 4.2.3 Consistency check

The following three values can be calculated from the three formulas mentioned in Chapter 3:

$$\lambda_{\max} = 6.029; \quad CI = \frac{\lambda_{\max} - n}{n - 1} = 0.006; \quad CR = \frac{CI}{RI} = 0.005 < 0.10$$

As the CR is less than 0.1, the judgment matrix can be considered to be reasonably constructed and we therefore calculated the weights of the indicators as shown in the following table 6:

Table 6 Two-by-two discriminant matrix ((Data based on expert scoring method questionnaire results))

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values

Professionalism U1	2.108	35.13%
Responsiveness U2	0.424	7.06%
Economical U3	0.73	12.17%
Empathic U4	0.437	7.28%
Assurance U5	0.916	15.27%
Diversity U6	1.385	23.09%

For each indicator weight, we apply the method of hierarchical analysis to find the weights of each indicator. Constructing the judgement matrix  $S = (u_{ij})_{p \times p}$ . See Table 7.

Table 7 Professionalism two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data					
	U11	U12	U13	U14	U15
U11	1.000	0.401	1.149	1.888	0.461
U12	2.491	1.000	3.366	4.183	1.320
U13	0.871	0.297	1.000	1.644	0.361
U14	0.530	0.239	0.608	1.000	0.280
U15	2.169	0.758	2.766	3.565	1.000

The following three values can be calculated from the three formulas mentioned in Chapter 3:

$$\lambda_{\max} = 5.010; \quad CI = \frac{\lambda_{\max} - n}{n - 1} = 0.002; \quad CR = \frac{CI}{RI} = 0.002 < 0.10$$

As the CR is less than 0.1, the judgment matrix can be considered to be reasonably constructed and we therefore calculated the weights of the indicators as shown in the following table 8:

Table 8 Weighting of professionalism indicators (Data based on expert scoring method questionnaire results)

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values

U11	0.708	14.17%
U12	1.829	36.57%
U13	0.585	11.71%
U14	0.396	7.91%
U15	1.482	29.64%

For each indicator weight, we apply the method of hierarchical analysis to find the weights of each

indicator. Constructing the judgement matrix  $S = (u_{ij})_{p \times p}$ . See Table 9.

Table 9 Responsive two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data		
	U21	U22
U21	1.000	0.425
U22	2.352	1.000

MATLAB software was used to calculate the maximum special detection value of  $S$  for the judgment matrix  $\lambda_{\max} = 2.000$ . The MATLAB software was used to calculate the weights of the indicators as shown in Table 10.

Table 10 Responsiveness indicator weights (Data based on expert scoring method questionnaire results)

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values
U21	0.597	29.83%
U22	1.403	70.17%

For each indicator weight, we apply the method of hierarchical analysis to find the weights of each

indicator. Constructing the judgement matrix  $S = (u_{ij})_{p \times p}$ . See Table 11.

Table 11 Economic two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data			
	U31	U32	U33
U31	1.000	2.169	2.352
U32	0.461	1.000	1.000
U33	0.425	1.000	1.000

The following three values can be calculated from the three formulas mentioned in Chapter 3:

$$\lambda_{\max} = 3.001; \quad CI = \frac{\lambda_{\max} - n}{n - 1} = 0.000; \quad CR = \frac{CI}{RI} = 0.001 < 0.10$$

As the CR is less than 0.1, the judgment matrix can be considered to be reasonably constructed and we therefore calculated the weights of the indicators as shown in the following Table 12:

Table 12 Weighting of economic indicators (Data based on expert scoring method questionnaire results)

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values
U31	1.591	53.03%
U32	0.714	23.80%
U33	0.695	23.17%

For each indicator weight, we apply the method of hierarchical analysis to find the weights of each

indicator. Constructing the judgement matrix  $S = (u_{ij})_{p \times p}$ . See Table 13.

Table 13 Empathic two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data			
	U41	U42	U43
U41	1.000	0.425	0.530
U42	2.352	1.000	1.741
U43	1.888	0.574	1.000

The following three values can be calculated from the three formulas mentioned in Chapter 3:

$$\lambda_{\max} = 3.012; \quad CI = \frac{\lambda_{\max} - n}{n - 1} = 0.006; \quad CR = \frac{CI}{RI} = 0.012 < 0.10$$

As the CR is less than 0.1, the judgment matrix can be considered to be reasonably constructed and we therefore calculated the weights of the indicators as shown in the following Table 14:

Table 14 Empathy indicator weights (Data based on expert scoring method questionnaire results)

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values
U41	0.565	18.85%
U42	1.481	49.38%
U43	0.953	31.78%

For each indicator weight, we apply the method of hierarchical analysis to find the weights of each

indicator. Constructing the judgement matrix  $S = (u_{ij})_{p \times p}$ . See Table 15.

Table 15 Guaranteed two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data			
	U51	U52	U53
U51	1.000	1.783	1.783
U52	0.561	1.000	1.000
U53	0.561	1.000	1.000

The following three values can be calculated from the three formulas mentioned in Chapter 3:

$$\lambda_{\max} = 3.000; \quad CI = \frac{\lambda_{\max} - n}{n - 1} = 0.000; \quad CR = \frac{CI}{RI} = 0.000 < 0.10$$

As the CR is less than 0.1, the judgment matrix can be considered to be reasonably constructed and we therefore calculated the weights of the indicators as shown in the following table 16:

Table 16 Weighting of assurance indicators (Data based on expert scoring method questionnaire results)

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values
U51	1.414	47.13%
U52	0.793	26.44%
U53	0.793	26.44%

For each indicator weight, we apply the method of hierarchical analysis to find the weights of each

indicator. Constructing the judgement matrix  $S = (u_{ij})_{p \times p}$ . See Table 17.

Table 17 Diversity two-by-two discriminant matrix (Data based on expert scoring method questionnaire results)

AHP data		
	U61	U62
U61	1.000	1.741
U62	0.574	1.000

MATLAB software was used to calculate the maximum special detection value of  $S$  for the judgment matrix  $\lambda_{\max} = 2.000$ . The MATLAB software was used to calculate the weights of the indicators as shown in Table 18.

Table 18 Diversity indicator weights (Data based on expert scoring method questionnaire results)

AHP Hierarchical Analysis Results		
Item	Eigenvectors	Weighting values
U61	1.27	63.52%
U62	0.73	36.48%

#### 4.2.4 HN Airline Pet Consignment Service Quality Evaluation Index Weights

Using all the calculation results, we can clarify the weight proportion status of each dimension indicator in the HN airline pet consignment business service evaluation system, and the

aggregation will lead to the comprehensive situation of the HN airline pet consignment business service quality evaluation system, as shown in Table 19.

Table 19 Weighting of each indicator (Data based on expert scoring method questionnaire results)

Tier 1 indicators	Weights	Tier 2 indicators	Weights	Combined weights
Professionalism U1	0.3513	U11	0.1417	0.049779
		U12	0.3657	0.12847
		U13	0.1171	0.041137
		U14	0.0791	0.027788
		U15	0.2964	0.104125
Responsiveness U2	0.0706	U21	0.2983	0.02106
		U22	0.7017	0.04954
Economical U3	0.1217	U31	0.5303	0.064538
		U32	0.238	0.028965
		U33	0.2317	0.028198
Empathic U4	0.0728	U41	0.1885	0.013723
		U42	0.4938	0.035949
		U43	0.3178	0.023136
Assurance U5	0.1527	U51	0.4713	0.071968
		U52	0.2644	0.040374
		U53	0.2644	0.040374
Diversity U6	0.2309	U61	0.6352	0.146668
		U62	0.3648	0.084232

### 4.3 Building a fuzzy integrated evaluation model

According to the construction process of the fuzzy comprehensive evaluation method model in Chapter 3, the fuzzy comprehensive evaluation method model of HN airline pet consignment business service quality evaluation was constructed.

#### 4.3.1 HN Aviation factor set, scoring criteria set and weighting set

The process of constructing the fuzzy integrated evaluation model in Chapter 3 was applied to the evaluation of the quality of HN Airlines' pet airline consignment services. Can be obtained by table 6:

$$W = (0.3513, 0.0706, 0.1217, 0.0728, 0.1527, 0.2309)$$

In the calculation of a comprehensive score of this thesis, five evaluation standards are set for each indicator.  $V = [V1, V2, V3, V4, V5]$  = [Very satisfied, more satisfied, general, less satisfied, very

dissatisfied], and the assignment is  $V = [5, 4, 3, 2, 1]$ .

#### 4.3.2 Source of data for HN Airline Pet Checking Business Service Quality Questionnaire

Due to the distance between Hainan and Chongqing, I used an online, anonymous questionnaire for the HN Airways Pet Consignment Service Quality Survey.

The place I chose to distribute the questionnaire was the HN Airways pet consignment business online experience quality feedback exchange group, which was not set up by the official HN Airways. The customers in the group were all consumers who had experienced HN Airways' pet air check-in service.

On 6 May 2023, I administered the questionnaire in the HN Airways Pet Air Checking feedback group. A total of 200 efficient questionnaires were sent out. Of these, 164 questionnaires were valid.

In my opinion, this is a good way of distributing the questionnaires because it is difficult for me to travel to Hainan and collect a large number of questionnaires in a short period of time, while the online feedback group ensures that the respondents are consumers who have experienced the business. The online mode of completion did not put too much pressure on the target population, and the reliability and validity of the final questionnaire analysis was relatively good.

The final questionnaire data analysis is shown in Table 20.

Table 20 Questionnaire evaluation results (Data from the HN Airline Pet Checking Service Quality Assessment Questionnaire)

Evaluation indicator						
Tier 1 indicators	Tier 2 indicators	Very satisfied V1	Satisfied V2	General V3	Dissatisfied V4	Very dissatisfied V5



Professionalism U1	U11	62	68	19	8	7
	U12	72	60	13	11	8
	U13	84	54	10	6	10
	U14	57	70	22	10	5
	U15	69	65	10	12	8
Responsiveness U2	U21	70	62	13	7	12
	U22	76	58	14	7	9
Economical U3	U31	60	64	22	7	11
	U32	76	60	10	8	10
	U33	68	65	16	7	8
Empathic U4	U41	64	68	15	10	7
	U42	66	61	21	7	9
	U43	68	62	17	6	11
Assurance U5	U51	56	71	19	9	9
	U52	80	54	13	11	6
	U53	66	69	11	11	7
Diversity U6	U61	69	58	18	13	6
	U62	65	61	18	9	11

### 4.3.3 Questionnaire Reliability Analysis

Before evaluating, the credibility and validity of the questionnaire survey need to be analyzed to ensure the consistency and effectiveness of the questionnaire feedback data called the subsequent evaluation process. Letter analysis is used to study the reliability and accuracy of quantitative data.

Table 21 Evaluation dimension Cronbach trust analysis

Cronbach reliability analysis

Item	Total correlation of correction items (CITC)	The alpha coefficient that has been deleted	Cronbach $\alpha$ coefficient
U11	0.759	0.97	
U12	0.822	0.969	
U13	0.828	0.969	
U14	0.743	0.97	
U15	0.821	0.969	
U21	0.824	0.969	
U22	0.804	0.969	
U31	0.773	0.969	
U32	0.831	0.969	
U33	0.789	0.969	0.971
U41	0.768	0.97	
U42	0.779	0.969	
U43	0.79	0.969	
U51	0.775	0.969	
U52	0.784	0.969	
U53	0.794	0.969	
U61	0.784	0.969	
U62	0.809	0.969	

Standardized cronbach  $\alpha$  coefficient: 0.971

Table 22 Question indicator summary Cronbach's trust analysis

Cronbach reliability analysis		
Number of items	Sample amount	Cronbach $\alpha$ coefficient

18

164

0.971

From the above table, it can be seen that the trust coefficient value is 0.971, which is greater than 0.9, so it shows that the research data is very high. For the "deleted alpha coefficient", after any question item is deleted, the factor coefficient will not rise significantly, so it shows that the questions should not be deleted.

For the "CITC value", the CITC value of the analysis items is greater than 0.4, indicating that there is a good correlation between the analysis items, and it also shows that the trust level is good. In summary, the value factor in the research data is higher than 0.9, which comprehensively illustrates the high quality of the data, which can be used for further analysis.

#### 4.3.4 Questionnaire validity analysis

Table 23 Validity analysis results of air cargo service quality evaluation

KMO and Bartlett tests		
KMO		0.977
Approximate chi-square		2546.764
Bartlett sphericity test	df	153
	p	0

As can be seen from the above table, KMO and Bartlett test were used for validity verification, with KMO value of 0.977 and KMO value greater than 0.8. The research data is very suitable for information extraction, and the validity is also well reflected from the side.

#### 4.3.5 Fuzzy integrated evaluation matrix

Based on the formula of the fuzzy comprehensive evaluation method in Chapter 3, the relevant data in Table 19 can be calculated to establish a single-factor fuzzy comprehensive evaluation matrix, as shown in Table 24.

Table 24 Single factor fuzzy comprehensive evaluation matrix (Data based on HN Airline Pet Checking Service Quality Assessment Questionnaire)

First-order index	Evaluation vector				
	Very satisfied	Satisfied	General	Dissatisfied	Very dissatisfied
Professionalism U1	0.426	0.382	0.081	0.062	0.048

Responsiveness U2	0.453	0.361	0.084	0.043	0.06
Economical U3	0.4	0.386	0.108	0.044	0.061
Empathic U4	0.404	0.382	0.113	0.044	0.056
Assurance U5	0.396	0.402	0.093	0.061	0.047
Diversity U6	0.412	0.36	0.11	0.07	0.048

Overall evaluation vector

$$B=W^* = (0.3513, 0.0706, 0.1217, 0.0728, 0.1527, 0.2309) \begin{bmatrix} 0.426 & 0.382 & 0.081 & 0.062 & 0.048 \\ 0.453 & 0.361 & 0.084 & 0.043 & 0.060 \\ 0.400 & 0.386 & 0.108 & 0.044 & 0.061 \\ 0.404 & 0.382 & 0.113 & 0.044 & 0.056 \\ 0.396 & 0.402 & 0.093 & 0.061 & 0.047 \\ 0.412 & 0.360 & 0.110 & 0.070 & 0.048 \end{bmatrix} = (0.416, 0.379, 0.095, 0.059, 0.051)$$

According to the specified evaluation grade scores are shown in the table 25.

Table 25 Rating scale (Data is model fixed content)

Evaluation level	Very satisfied	Satisfied	General	Dissatisfied	Very dissatisfied
Score	5	4	3	2	1

The overall score obtained is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.416 \\ 0.379 \\ 0.095 \\ 0.059 \\ 0.051 \end{bmatrix} = 4.05$$

The score obtained for the professionalism dimension is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.426 \\ 0.382 \\ 0.081 \\ 0.062 \\ 0.048 \end{bmatrix} = 4.073$$

The score obtained for the responsiveness dimension is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.453 \\ 0.361 \\ 0.084 \\ 0.043 \\ 0.060 \end{bmatrix} = 4.107$$

The score obtained for the economical dimension is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.400 \\ 0.386 \\ 0.108 \\ 0.044 \\ 0.061 \end{bmatrix} = 4.017$$

The score obtained for the empathic dimension is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.404 \\ 0.382 \\ 0.113 \\ 0.044 \\ 0.056 \end{bmatrix} = 4.031$$

The score obtained for the assurance dimension is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.396 \\ 0.402 \\ 0.093 \\ 0.061 \\ 0.047 \end{bmatrix} = 4.036$$

The score obtained for the diversity dimension is:

$$F = VB^T = [5 \quad 4 \quad 3 \quad 2 \quad 1] \begin{bmatrix} 0.412 \\ 0.360 \\ 0.110 \\ 0.070 \\ 0.048 \end{bmatrix} = 4.018$$

#### 4.4 Overall rating of service quality

Based on the calculated composite score and the individual scores for the six dimensions, we can plot the resulting Figure 3. Using expert scoring method, hierarchical analysis method, questionnaire method and fuzzy comprehensive evaluation method, we obtained a comprehensive score of 4.05 for the service quality evaluation of HN Airlines' pet consignment business, which is slightly higher than the satisfactory service quality level of 4, between satisfactory and very satisfactory, indicating that customers who have really experienced the airline pet consignment business still have a high recognition of HN Airlines' business level.

However, if we take the overall score of 4.05 as the average expectation of customers, the professionalism, responsiveness and economy of HN Airline's pet check-in service are up to standard, but the empathy, assurance and diversity of HN Airline's pet check-in service are not up to standard, indicating that these three aspects deserve further optimization by HN Airline. In particular, as the only airline in China to offer a pet-in-cabin service, the airline scored the lowest in diversity compared to the other five dimensions, and it is worth considering the reasons for this.

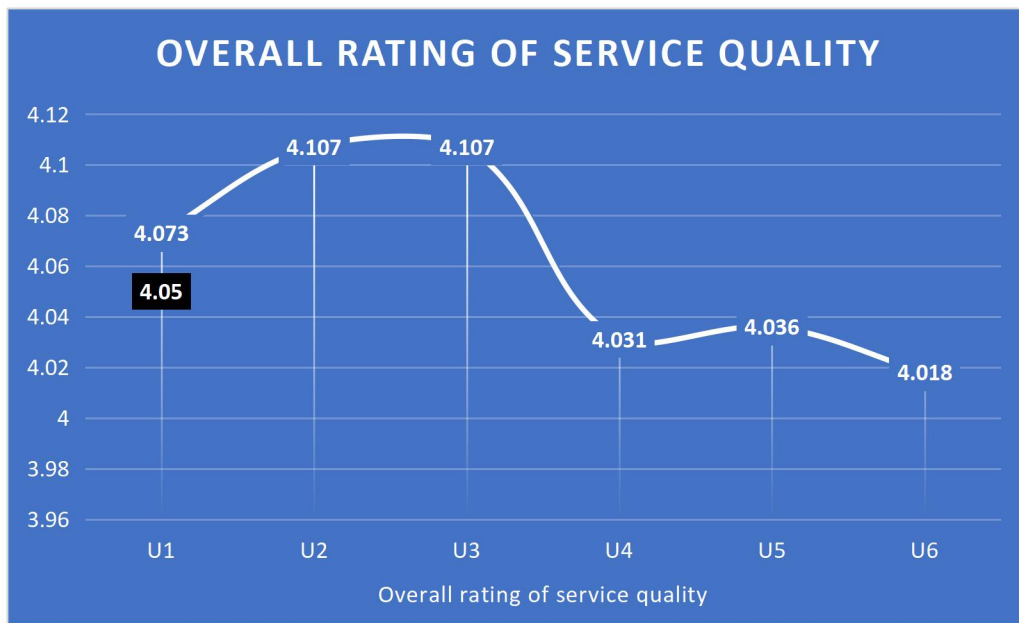


Figure 3 Overall rating of service quality (Data based on HN Airline Pet Checking Service Quality Assessment Questionnaire)

Secondly, through the results of the entire evaluation, we can see that 42%, 38%, 9%, 6%, and 5% of HN Airlines pet consignment service are satisfied with the service quality of the entire questionnaire, as shown in the Figure 4. As a whole, the most users are in a very satisfied state, accounting for 42% of the whole, but there are still nearly 20% users are not very satisfied and

satisfied, which is also the reason that the final score is only slightly higher than the satisfaction level of 0.05 point.

Finally, in the entire evaluation system of HN Airlines pet consignment service quality, the weight of professionalism is the highest, accounting for 35% of all the first-level indicators, and there are 42.6% of consumers and 38.2% of consumers are very satisfied with the professional attitude. Contributed the most to the overall rating. In the evaluation of diversity, the proportion of dissatisfied and very dissatisfied is higher, and the sum of the two is more than 11%. Although the phenomenon of more poor evaluation of diversity has little influence on the overall evaluation, diversity still accounts for 23% of all the first-level indicators. Without effective improvements, it is likely that the quality rating of HN Air's pet consignment service will fall from a rating stage of 5-4 to a satisfaction rating range of 4-3.

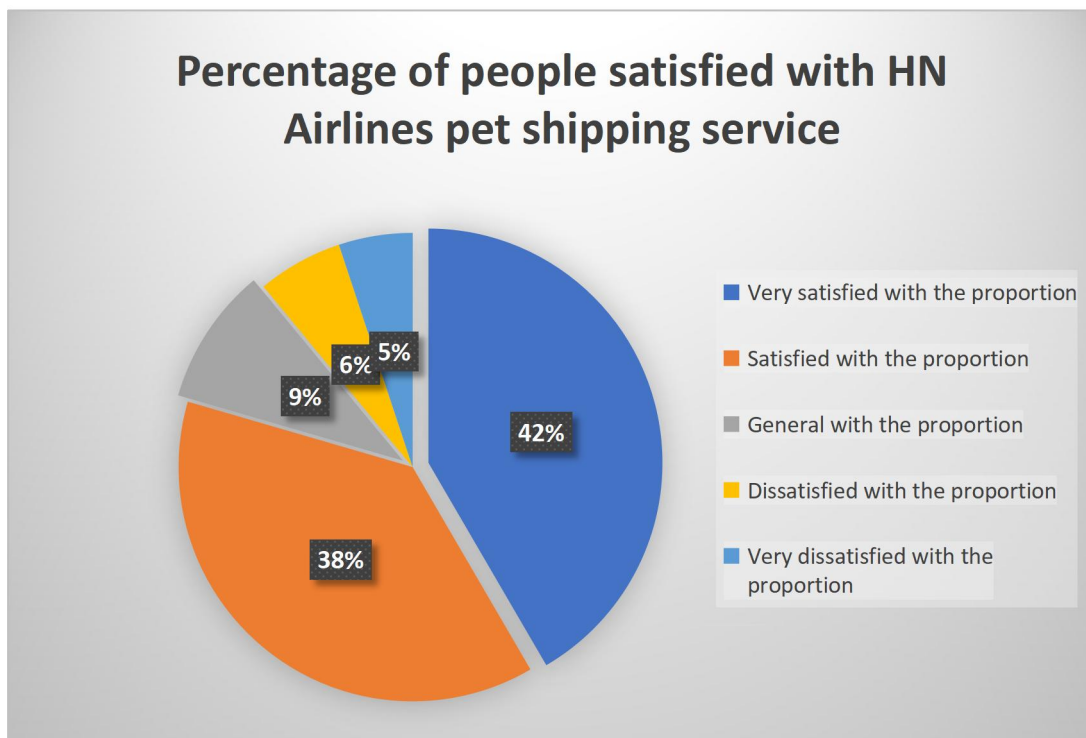


Figure 4 Percentage of people satisfied with HN Airlines pet shipping service (Data based on HN Airline Pet Checking Service Quality Assessment Questionnaire)

#### 4.4.1 Personal Reflections

As someone who has experienced Sichuan Airlines' pet consignment service, this result was rather unexpected to me, as the public opinion environment in China on pet air consignment is still dominated by negative information, and from time to time you can see TikTok and Weibo and other large streaming media platforms reporting on unfortunate accidents occurring during pet consignment by airlines, which has caused widespread discussion. At the same time there is a

more obvious gap between domestic airlines' pet air check-in operations and such operations by foreign airlines. So prior to this my subjective prediction of the survey results was probably at the fair to satisfactory, or 3-4 overall score stage.

However, the final score was 4.05, which is between satisfactory and very satisfactory. This result, in my opinion, shows that the acceptance of HN Airlines' pet shipping service by customers who have actually experienced it is high.

Combined with the information I have collected on HN Airlines' pet consignment service, I believe there are several reasons for this finding: firstly, only China Southern Airlines, China Eastern Airlines, Shanghai Airlines, Shenzhen Airlines, Sichuan Airlines, Hainan Airlines, Shandong Airlines, Air China and Capital Airlines currently offer pet air transport services. Among them, Hainan Airlines also offers pets in the cabin, while other pets can only be placed in the cargo hold. This is the first time such a service has been attempted by any airline in China and has been very well received by consumers in the Chinese market.

Secondly, Hainan Airlines is the first airline in mainland China in terms of service and cabin environment. It is also the only airline in mainland China to have a Skytrax 5-star rating. This has led to consumers rating Hainan Airlines' service quality consistently well in recent years.

So based on the above two points, it seems to me that there is some element of luck in the overall score of HN Airlines' pet check-in business. According to the model, the result is only slightly above the satisfaction value of 0.5 points, indicating that there are still some areas where Hainan Airlines could be improved.

#### **4.5 Analysis of the importance of evaluation indicators and satisfaction**

Using the importance of HN airline pet consignment service quality evaluation indicators (comprehensive weights) obtained earlier and the satisfaction of service quality obtained from the questionnaire (mean value of evaluation indicator scores) as shown in Table 26, a quadrant chart of service quality importance and satisfaction was established to analyze the importance of and satisfaction with HN airline pet consignment service.

Table 26 Mean values and combined weights of evaluation indicator scores (Data from the results of the model analysis in the previous sections)

Tier 2 indicators	Satisfaction (average)	Importance (combined weights)
-------------------	---------------------------	----------------------------------



U11	Customers have access to the latest information on pet consignments	4.04	0.0498
U12	Pets are protected from harm during the shipping process	4.08	0.1285
U13	Pets are shipped in accordance with the customer's requirements and transport plan	4.2	0.0411
U14	Personal information is protected from disclosure	4	0.0278
U15	Reasonable compensation and clarity on the cause of injuries sustained during the shipment of pets	4.07	0.1041
U21	Service hotline is open	4.04	0.0211
U22	Promptly and effectively handle customer enquiries and complaints	4.13	0.0495
U31	Low prices compared to the industry	3.95	0.0645
U32	Pet consignment charges are open, reasonable and transparent	4.12	0.0290
U33	Set fees that are reasonable and uniform compared to the industry	4.09	0.0282
U41	Maintain good communication and care for customer needs	4.05	0.0137
U42	Documentation for pet consignments is simple and easy to understand	4.02	0.0359
U43	Remind customers to prepare documents in accordance with shipping documents	4.04	0.0231
U51	Good image of the airline	3.95	0.0720
U52	Good attitude of service staff	4.16	0.0404
U53	Professional and skilled service staff	4.07	0.0404
U61	More pets can be covered in the pet shipping business category	4.04	0.1467
U62	More additional services available in addition to the basic services	3.98	0.0842

#### 4.5.1 Constructing a two-dimensional matrix diagram

In order to further analyze the strengths and weaknesses of the service quality of HN Air's pet consignment business, this paper constructs a two-dimensional matrix with the mean value of each evaluation index as the horizontal axis and the customer satisfaction with the service quality as the vertical axis, as shown in Figure 5. However, it is important to note that each business of HN Air's pet shipping service is compared horizontally with its own performance on other dimensions of the same service in this matrix. The matrix is divided into four quadrants and the meaning of each quadrant is as follows:

Quadrant A: High Satisfaction High Importance Indicator. An indicator that experts consider this business to be important and that HN Airlines serves its customers well. For example: U12、U15.

Quadrant B: High satisfaction and low importance indicators. This is a quadrant in which the expert does not consider this business to be very important but HN Airlines is doing a good job in this area. For example: U13、U22、U32、U33、U52、U53.

Quadrant C: Low satisfaction and low importance. The experts consider this business to be less important and HN Airways is also negligent. For example: U11、U14、U21、U41、U42、U43.

Quadrant D: Low satisfaction and high importance. The experts consider this business to be important and HN Airways is lacking in these areas of service and is a priority area for improvement. For example: U31、U51、U61、U62.

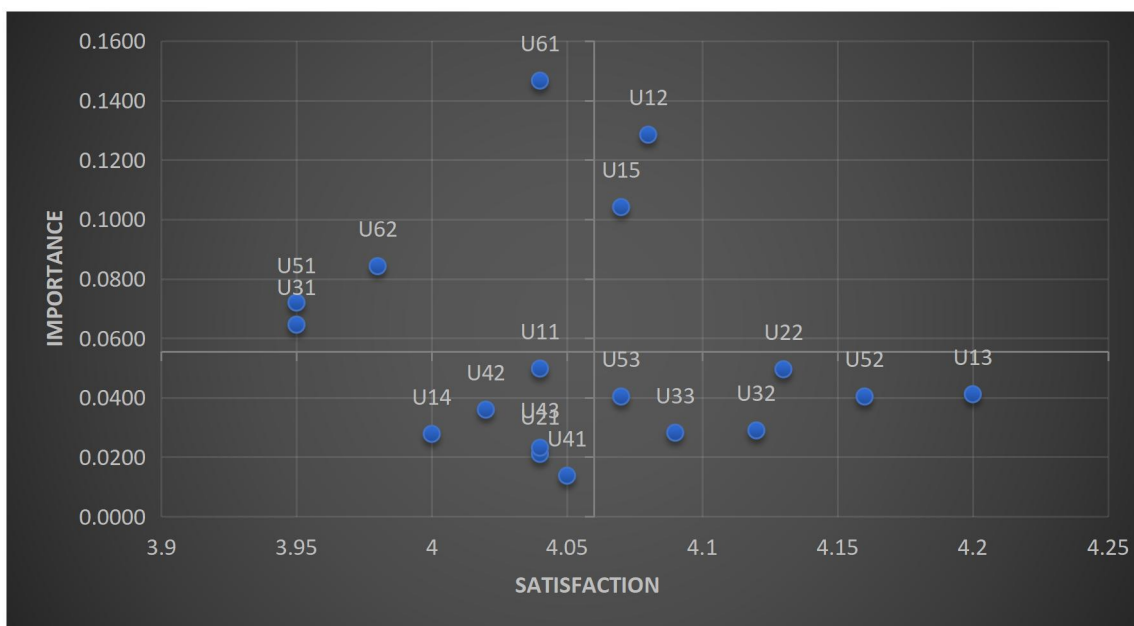


Figure 5 Service quality importance and satisfaction quadrant chart

## 5 Quality Improvement Measures for HN Airlines Pet Consignment Services

Based on the hot issues in China's pet airline shipping business mentioned in Chapter 2 and the empirical analysis and findings of HN Airline's pet shipping business in Chapter 4, this chapter will first demonstrate the specific problems in HN Airline's pet shipping business at each service touch point through a customer journey map to make the business process more tangible. Based on this, specific improvement measures will be proposed in conjunction with the results of the empirical analysis in Chapter 4.

### 5.1 Customer Journey Map

I will use customer journey mapping to model the customer needs and goals generated by HN Air's pet transport business throughout the service process, while identifying the corresponding service touch points through customer behaviour at each stage and corresponding to the pain points identified in the previous questionnaires. Finally, I will give my improvement strategies and measures.

Some scholars have established a "desire" model through binary flip after analysing the basis of customer history based on the customer journey map through the positive creation method, systematically digging into customer complaints during the pet air logistics service experience and proposing solutions to integrate existing feasible technical resources to achieve a new service system and give customers a better service experience. (Zeng, 2021) This helped me to develop the diversity and effectiveness of subsequent improvement measures when they were proposed.

At the same time, all stakeholders should be considered in the process of improving the service quality of HN Air's pet consignment business, taking into account the needs of users, pets, consignors and airlines. All stakeholders should enjoy a pleasant and efficient service through innovative design.

Table 27 HN Air pet consignment service user trip map

Stage	pre-consignment	Go through the formalities	Pet boarding	In consignment	End of consignment
-------	-----------------	----------------------------	--------------	----------------	--------------------

User behavior	Go to the airport and apply or entrust a pet logistics company	Take your pet for a variety of tests and apply for a variety of procedures	Buy a suitcase and send your pet to the airport for packing	Get on a plane together or wait at your destination	Wait for pets to arrive at the specific luggage carousel
Requirements and objectives	Check pet needs, looking for flights available	Understand the handling methods of various procedures and the timeliness of certificates	Purchase a pet airbox in accordance with the regulations and pack it to the designated place	Waiting for the pet to arrive, wanting to know the status of the pet	Wait for your pet to arrive at the airport and find your own suitcase
Contact point	Airline official website, small shipping company	Offline pet hospitals, epidemic prevention stations and other official departments	Online shopping, airport luggage check	Flight information	Online search or ticket information
Pain point problem	There is no information summary for pet consignment, so users need to find it by themselves	The required procedures are time-sensitive and inexperienced for the first time	Air cases do not meet the requirements of the need to buy again and end of the consignment easily idle	Unable to obtain real-time pet information, causing customer concern	There is no sign on the airline case, so it is impossible to find the personal airline case quickly

Scheme assumption	Design pet logistics service APP to find information quickly and conveniently	Notes and specific procedures for handling procedures in the APP	By the airline to provide unified pet air box, after the end of the consignment recovery	Cameras and lights are set up in the compartment so that customers can get real-time information such as the status of their pets	The APP displays the exact location of the pet, and at the same time, an obvious digital identifier is added on the surface of the airline case
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**5.1.1 Improve service facilities and show professionalism**

The focus is on the design of the service APP and the upgrade of the air consignment box. These two parts of the service facilities can be involved in pain points from the consignment to the end of the consignment covered.

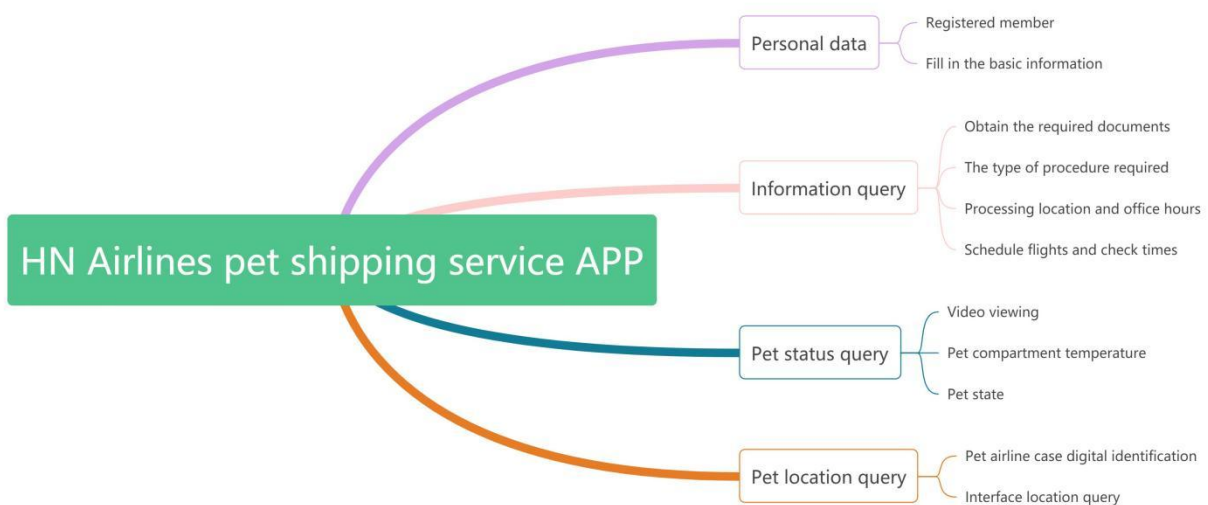


Figure 6 HN airline pet shipping service APP design framework

Building on the pet air crates required for HN Air pet consignments. Firstly, cameras and sensors can be added to pet logistics air crates to give users real-time information about their pets during transport, reducing their concerns about their pets' safety and improving the user experience on a psychological level. Improve the assurance and professionalism of the business.

Secondly, increase the application of APP in pet air logistics services, as shown in Figure 6. For first-time pet consignment users, there are many procedures to be followed and the timeliness is poor. Using the APP to integrate the consignment requirements and procedures of each airline can simplify the operational steps and save time and effort for users. Improving the empathy of the business.

On the other hand, APP can also be combined with the monitoring equipment mentioned above to provide a platform for users to inquire about their pets' information. At the same time, the traditional way of purchasing pet air crates will be transformed into HN Air's rental service. Existing pet air logistics services require users to purchase their own pet air crates. However, due to technical and safety implications, airlines have detailed and strict requirements for pet air crates, which often do not meet the requirements. HN Aviation can provide suitable air crates according to the user's requirements, which will not only effectively solve this problem, but also avoid the waste of idle air crates after use. Improving the professionalism and economy of the business.

Finally, food, drinking water and other equipment are added to the air box according to the physiological and psychological needs of the pet. Existing pet air crates focus only on the efficiency of the pet transport process, ignoring the comfort of pet transport, resulting in some users being dissatisfied with pet air logistics services. Focusing on the needs of pets not only provides further protection for the safety of pets, but also makes users more satisfied and at ease with pet air logistics services. Improve the empathy and assurance of the business.

### **5.1.2 Improve the rules and regulations of pet air consignment**

Government agencies should set up a separate department to deal with such incidents in order to improve work efficiency. In addition, relevant laws and regulations should be formulated to clearly divide the responsibilities of pet owners and airlines, and properly solve disputes arising from accidents in the process of pet transportation. At the same time, the degree of injury and death of pets is classified and the compensation amount is set according to it, so as to improve the environment of pet air transport and promote the steady development of the pet aviation industry. This will not only improve the evaluation of the various dimensions of the business, but most importantly provide a more orderly pet logistics market as a whole.

### **5.1.3 Improve the professionalism of service personnel**

The staff who can master the skills of pet maintenance and first aid is a strong guarantee for the safe transportation of pets. Therefore, our civil aviation administration should organize professional personnel training, and set up a set of assessment system, for the staff who pass the assessment to issue qualifications, and require a certificate on duty, so as to improve the professional quality of

the staff. At the same time, HN Airlines should strictly check applicants when recruiting staff, and conduct simulation training on relevant scenarios after taking the job, so as to increase employees' experience in dealing with emergencies. In addition, HN Airlines will monitor the process of moving and unloading pets in real time to avoid injuries and deaths caused by staff teasing pets out of curiosity. Enhancing the professionalism and assurance of the business.

#### **5.1.4 Reduce pet airline shipping fees**

Specific fees and requirements for booking and checking in can be found on the HN Airlines website. HN Airlines can simplify the pet shipping procedures and combine the three certificates required for pet shipping, namely "Animal Quarantine Certificate", "Pet Certificate" and "Pet Container Disinfection Certificate", into one "Animal Quarantine Certificate". In addition, HN Airlines can improve customer satisfaction by establishing a pet information database to collect pet inspection information, thus simplifying the procedures for the next shipment. In terms of air transport costs for pets, airlines should make detailed classification of transport costs, formulate corresponding price lists according to the size, body type, habits and other information of pets, and make relevant information public. Improve the professionalism and economy of the business.

#### **5.1.5 Business bold innovation**

Some scholars have mentioned that Latin American Airlines in Brazil has set new regulations for pet transport, limiting the range of pets that can be transported. (Guo, 2022) The type of pet has been one of the restrictions on pet air check-in. And since its launch, HN Air's Pet Cabin Care service has won the attention and praise of consumers. Meanwhile, the service has been upgraded in the following years, including the addition of several applicable cities and the removal of pet weight restrictions. This shows that the continuous reduction of transport restrictions has had a significant impact on motivating customers to handle the business. Although HN Airlines was the first domestic airline to implement a pet cabin transportation service, which is worthy of learning from other domestic airlines, there are still many restrictions. I think HN Airlines can boldly learn from the mature and advanced pet check-in business of airlines such as Delta Air Lines.

## 6 Conclusions

As the number of pet owners in China grows rapidly, so does the demand for pet aviation logistics. For pet owners, pets as spiritual sustenance, into a lot of effort and emotion, so pet aviation logistics and traditional logistics transport is different in essence. Compared with cargo transportation, pet aviation logistics not only requires efficient transportation, but also pays more attention to the safety and physiological needs of pets.

Based on the initial dimension index of SERVQUAL model and related literature of pet aviation shipping, this paper determined the dimension index suitable for HN airline pet shipping service providers to conduct service quality survey. Then through the questionnaire expert score, with the analytic hierarchy process to get the weight of each dimension index. Then questionnaire was used to conduct a survey on the service satisfaction of HN Airlines pet shipping business. Finally, the final survey results were obtained by fuzzy comprehensive evaluation method and customer journey map was used to show the differences before and after the improvement of HN Airlines pet shipping business.

Although HN Airlines still has many shortcomings in maturity and specialization compared with Delta Airlines and other foreign airlines in pet transport business, it is the first bold innovation leader among all Chinese airlines in pet air transport business. By evaluating the service quality of HN Airlines' pet consignment business, we can objectively judge the satisfaction degree and demand degree of domestic customers for HN Airlines' pet consignment business at the present stage.

### 6.1 Self-acquisition

The writing of this thesis has given me insight into the use of the SERVQUAL model, hierarchical analysis, fuzzy integrated evaluation and customer journey maps.

In particular, I created four versions of the questionnaire before and after conducting the survey questionnaire for people who have experienced pet air check-in. From the beginning, I only considered the questions that I wanted to put on the survey, without considering the target group's burden of understanding the questionnaire, and the questionnaire was full of various technical terms. Then later on I was able to really take the customer's point of view and better help them to score the supervisor's feelings. I think this was a very valuable experience. I was also pleased to be able to complete the research project on the evaluation of the quality of HN Airline's pet consignment service. I had very little access to the literature when I did my preliminary research, so I went on a two-month internship at China Post, where I actively interacted with the marketing



manager and the staff in the special logistics department who are responsible for pet transport-related business, in order to gain a better understanding of this area of the pet transport business.

But after completing my research on this topic, I was left with more questions to ponder; why have other airlines been so slow to change, given HN's dominance of the pet airline business in China? Why have the airlines failed to make any significant improvements, given that all major airlines in China have had major and minor pet check-in incidents? I would like to pursue these follow-up questions in the future if I have the opportunity.

## **6.2 Expectations**

I chose the area of pet air freight service quality evaluation for my research because I am one of the customers who have had a deep experience with Chinese airlines' pet shipping services. I have four dogs and cats at home, and every year when I travel, I choose to take my pets with me to the place I am travelling to because I am not comfortable with boarding them.

I still remember my first experience with airfreight very clearly. From the joy of preparing the pet's travel plan and planning the exact time of travel, to the worry of taking the pet for a health check, to the anxiety of having to go through the complicated and time-consuming procedures required to check your pet in, to the excitement of putting your pet on the plane when everything was ready, to the fear of having an accident while waiting, and to the fatigue of having to confirm several times when picking up your pet that the airplane is your own. to the exhaustion of having to check several times that the airline cabin is your own, to the peace of mind when you finally receive your pet at the end of your pet's check-in. It seems to me that there are few other similar services that would have caused me so many emotional ups and downs in such a short period of time, so I am even more convinced of the importance of airfreight. At the same time, I believe that pet air freight is an important measure of an airline's ability to be a truly outstanding and innovative service provider, and will be one of the ways in which airlines can differentiate themselves at a time when the difference in quality of service between airlines is diminishing.

I also sincerely hope that with the further development of technology in the future, it will help to make the pet airline shipping business more intelligent and informative, forming a better industry atmosphere and promoting the high quality development of the pet airline shipping business, so that every consumer can experience a more relaxed and pleasant service.

## Sources

An Hong, Ma Lei & Feng Jian.(2010). Comprehensive evaluation of aviation military logistics Transportation control System based on Fuzzy-AHP. Logistics Technology (19),137-138.

Chao, C. C. , & Lin, J. F. . (2013). A study on improvement of airlines' cargo service quality. Journal of Aeronautics, Astronautics and Aviation, Series A, 45(3), 161-170. DOI: 10.14076/j.issn.1006-2025.2018.12.09

Cheng Zhaoli, Zhou Yongming, Liang Rong, Guan Yuzheng. Research on the development of pet logistics and its operation mode[J]. Logistics Engineering and Management,2017,39(06):57-59+14.

Guo Cheng. Pet consignment has differences at home and abroad [J]. China Storage and Transportation, 2017 (8): 54.

Guo Shoutang.(2022). Brazil's Latin American Airlines set new pet consignment regulations. China Work dog Industry (11),70.

Hainan Airlines small animal consignment-general provisions.

[https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/202108/t20210831\\_48915.html](https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/202108/t20210831_48915.html)

Hainan Airlines small animal consignment - pet box requirements

[https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/201905/t20190524\\_38235.html](https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/201905/t20190524_38235.html)

Hainan Airlines Small animal consignment - Fee standards and other policies

[https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/201905/t20190524\\_38234.html](https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/201905/t20190524_38234.html)

Hainan Airlines Small Animal Consignment - Booking and handling requirements

[https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/201905/t20190524\\_38238.html](https://www.hnair.com/lvxingxinxi/tsgh/tyxdw/tyxdw/201905/t20190524_38238.html)

Huang R, Yan L, Zhang ZD. Research on the evaluation system of air logistics based on sustainable development [J]. Logistics Engineering and Management,2017,39(09):34-36+44.

Jian Fengfeng, Tan Jie,Bi Yuntian. Research on Pet Business Strategy and Service Design in Internet Economy Taking an APP Platform Development Project as an Example[C]//.Proceedings of Second International Conference on management, economics and law.,2021:258-267.

Jin Chanyu & Liu Wenge.(2022). Current situation and countermeasures of pet logistics in China. Logistics Technology (01),21-25.

Jiang Yihan. Research on the design of pet logistics air box based on service design thinking[D]. Lu Xun Academy of Fine Arts, 2022. DOI: 10.27217/d.cnki.glxmc.2022.000096

Jia Guoling,Wang Jianwei. Evaluation of service quality of Xi'an Yuan Tong Express based on SERVQUAL-IPA model [J]. Railway Transportation and Economy,2019,41(10):57-63. DOI: 10.16668/j.cnki.issn.1003-1421.2019.10.10

Liu Chao,Shi Hongxin,Zhu Jiale,Hu Zhihong,Deng Peng. Design of smart pet wearable device based on STM32 microcontroller[J]. Electronic Technology and Software Engineering,2017(23):254-255.

Pai Du, 2023. China Animal Husbandry Association on the release of the White Paper of China's Pet Industry -- China's Pet Consumption Report 2022.

<https://36kr.com/p/2155618644196871>

Pan Chunyang. Analysis of pet logistics development in China [J]. Market research, 2016 (12) : 26-28. DOI: 10.13999/j.cnki.scyj.2016.12.011

Tian Xue,Wang Dandan,Wang Chen. Research on the evaluation model of aviation ground logistics service quality--Taking the capital international airport as an example[J]. Price Monthly,2018(12):50-56. 10.14076/j.issn. DOI: 10.14076/j.issn.1006-2025.2018.12.09

Vinod Yadav Milind Kumar Sharma , (2016),"Multi-criteria supplier selection model using the analytic hierarchy process approach", Journal of Modelling in Management, Vol. 11 Iss 1 pp.

Wang R H & Wang D H. (2013). Research on aviation service quality evaluation. Economic Research Guide (17),73-74.

Wu Shengli. South China Airlines upgrades pet consignment service[J]. China's working dog industry,2022(10):66.

Wei Gan,Xin Li,Bo Huang,Weiyi Chen. Design and Implementation of Pet Logistics Service System based on the Internet of Things[C]//.Proceedings of 1st International Symposium on Economic Development and Management Innovation(EDMI 2019). ,2019:198-204.

Wang Yan. Research on service quality evaluation of railway pick-up and delivery service[J]. Railway freight,2018,36(12):11-16. DOI: 10.16669/j.cnki.issn.1004-2024.2018.12.03

Xu Dongyang,Liu Tengbo. Analysis of pet air transport problems in China and research on countermeasures [J]. Logistics engineering and management, 2018 (10):35-36+78.

Yang, Liqiang. Research on the design of intelligent transport pet box based on user experience [D]. Shanghai University of Engineering and Technology, 2020. DOI: 10.27715/d.cnki.gshgj.2020.000718

Zhang Xuelong, Wang Junjin, Luo Hui & Zeng Qingguang.(2016). Research on FCE-AHP Evaluation model of Guangxi Aviation Logistics Competitiveness. Mathematics in Practice and Understanding (24),49-59.

Zhu Shu-ting. Airlines try to carry pets in aeroplane cabins[J]. China Working Dog Industry, 2019 (5) : 54-55.

Zhu Hanmin,Yao Hua,Liu Bin. Research on the construction of container multimodal transport efficiency evaluation index system[J]. Railway Transportation and Economy,2018,40(05):8-14. DOI: 10.16668/j.cnki.issn.1003-1421.2018.05.02

Zeng Xiangyuan & Wu Jinchao.(2021). Design Concept of pet aviation logistics Service. Design (01),105-107.









## Appendix 2. HN Airlines pet consignment service quality survey

### HN Airlines pet consignment service quality evaluation survey

Dear Consumers,  
Hello!

This questionnaire will evaluate the satisfaction of Hainan Airlines' service quality in the pet air consignment business from 6 major dimensions and 18 minor indicators. Please evaluate the corresponding score of {5,4,3,2,1} of all the indicators mentioned in the question (very satisfied, satisfied, general, dissatisfied, very dissatisfied). Tick off the corresponding level. This questionnaire is anonymous, please feel free to fill it in. The data of the questionnaire is only used for statistical analysis of the survey. Thank you very much for your participation and support!

- \* 1. Please score according to the latest pet shipping information available to customers in terms of the professionalism of HN Airlines pet shipping service:

Very dissatisfied Very satisfied

①                      ②                      ③                      ④                      ⑤

- \* 2. Please score according to HN Airlines' professional handling of pet aviation, to ensure that pets are not harmed in the shipping process:

Very dissatisfied Very satisfied

①                      ②                      ③                      ④                      ⑤

- \* 3. Please score your pet consignments according to customer requirements and transportation plan of HN Airlines in terms of the professionalism of the pet aviation transportation business:

Very dissatisfied Very satisfied

①                      ②                      ③                      ④                      ⑤

- \* 4. Please score according to the professional aspects of HN Airlines' pet air consignment service and ensure that users' personal information is not leaked:

Very dissatisfied Very satisfied

①                      ②                      ③                      ④                      ⑤

- \* 5. Please score according to HN Airlines' ability to provide reasonable compensation and clear reasons for pet injuries in pet transportation:

Very dissatisfied Very satisfied

①                      ②                      ③                      ④                      ⑤

- \* 6. Please rate HN Airlines according to the responsiveness of pet Air transportation service and the availability of service hotline:

Very dissatisfied Very satisfied

①                      ②                      ③                      ④                      ⑤

\* 7. Please rate HN Airlines' timely and effective handling of customers' business inquiries and complaints in terms of its responsiveness to pet aviation shipping services:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

\* 8. Please rate HN Airlines according to its lower price compared with the same industry in terms of the economy of pet air transportation business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

\* 9. Please score according to HN Airlines' open, reasonable and transparent pet shipping charges in terms of the economy of pet airline shipping business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

\* 10. Please score according to the reasonable and uniform fees of HN Airlines compared with the industry in terms of the economy of pet air transportation business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

\* 11. Please score according to HN Airlines' empathy for pet airline shipping business, good communication and concern for customer needs:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

\* 12. Please score according to the document operation process of HN Airlines pet shipping business in terms of empathy, which is simple and easy to understand:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

\* 13. Please remind the customer to prepare materials according to the transportation document requirements and score according to the empathy of HN Airlines in the pet air transportation business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	



- \* 14. Please rate HN Airlines according to its good image in terms of the guarantee of pet air transportation business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

- \* 15. Please rate HN Airlines according to the good attitude of the service staff in terms of the guarantee of the pet air transportation business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

- \* 16. Please score according to the professional knowledge and proficiency of HN Airlines' service personnel in terms of the guarantee of pet air transportation business:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

- \* 17. Please rate HN Airlines according to the diversity of its pet air consignment business and the number of pet consignment business categories covering more pets:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

- \* 18. Please rate HN Airlines according to the variety of pet air transportation services, more additional services besides the basic services available:

Very dissatisfied		Very satisfied
①	②	③
④	⑤	

