Cruise Ship Pricing Strategy Research

Minghao Yan

School of North China Electric Power University Baoding China

2477061602@qq.com

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Abstract. This paper researches how the cruise company prices reasonably for the purpose of finding favors of more clients today with the rapid development of cruise tourist industry. We try to set up the tourist upgrade intention model, and make the upgrade scheme for the company, to maximize the expected ticket earnings. This paper comprehensively utilizes the Cobb-Douglas Function in the economics, divides into two situations by the standard for the quantity of residual seats of the first-class cabins, and makes the further subdivision in each category. In view of various situations, it is aimed to maximize the earnings of the cruise company while maximizing the satisfactory function. Finally, it finishes the earning maximization model of the satisfaction by improvement of Cobb-Douglas Function.

1. Introduction

With the substantial enhancement of the national economy in recent years, more and more countrymen choose to travel and relax in the way of taking the cruise ship, which correspondingly promotes the rapid development of the cruise company. This market status demands the cruise company provide the reasonable pricing, in the hope of attracting more consumers, and accordingly gaining larger earnings.

2. The establishment and solution of the model

2.1 Model assumptions

In this paper, assuming at the departure of the cruise, the number of people in the first class is F, the second class is S, and the third class is T. The number of people who are willing to upgrade from the second class to the first class is X_1. The number of people who are willing to upgrade from the third class to the first class is X_2, and the number of people who are willing to upgrade from the third class to the second class is X_3.

The current price of the first-class is A, and the second class is B.

The company's value degree of the customers of the first class, the second class and the third class is j_1, j_2,j_3($j_1+j_2+j_3=1$), respectively. The spare capacity of the first class is M_1.

2.2 Model and scheme of visitors' will of upgrade

2.2.1 When $M_1 \geq X_1+X_2$

Number all the people who have the will to upgrade from the second class to the first class, namely . a_1,a_2 ,a_3…a_{x1}. When buying tickets, the prices they will pay for the tickets are b_1,b_2 ,b_3…b_{xi}. The current price for the first-class is A, so the fees for the upgrade required to pay for each individual are A-b_1, A-b_2, A-b_3…A-b_{xi},. Number all the people who have the will to upgrade from the third class to the first class, namely c_1,c_2 ,c_3…c_{x2}. When buying tickets, the prices they will pay for the tickets are d_1,d_2 ,d_3…d_{x2}. The current price for the first-class is A, so the fees for the upgrade required to pay for each individual are A-d_1, A-d_2, A-d_3…A-d_{x1}. At that time, the second class has $450 – S + X_2$ vacancies.

2.2.1.1 When $450 – S + X_2 \geq X_3$

Number all the people who have the will to upgrade from the third class to the second class, namely e_1,e_2 ,e_3…e_{x3}. When buying tickets, the prices they will pay for the tickets are f_1,f_2

,$f_3 \ldots f_{x3}$. The current price for the second class is *B*, so the fees for the upgrade required to pay for each individual are $B-f_1, B-f_2, B-f_3 \ldots B-f_{x3}$.

In such case, the objective function is

$$Y=\sum_{i=1}^{x_1}(A-b_1)+\sum_{i=1}^{x_2}(A-d_i)+\sum_{i=1}^{x_3}(B-f_i)\circ$$

The subject aims to seek the maximum value of the objective function.

2.2.1.2 When 450-S+X_2＜X_3

Due to the fact that the spare cabins cannot meet the demand of people who have the will to upgrade, we plan to use the money replenishment pattern of setting unified prices for upgrade replenishment, set it as K_3. Consideration must be given to both the maximization of customers' profits and the highest value of expectation. Individual value of expectation is

$U(e_i)=\begin{cases}\dfrac{B}{K_3+f_i},(k_3+f_i>B)\\ 1,(K_3+f_i\le B)\end{cases}$, according to the Cobb-Douglas Function, the satisfaction function is

$$\max U=[T-X_2-X_3]^{j_3}\left[S-X_1+\sum_{i=1}^{x_3}U(e_i)\right]^{j_2}[F+X_1+X_2]^{j_1}$$

the objective function is

$$Y=\sum_{i=1}^{x_1}(A-b_i)+\sum_{i=1}^{x_2}(A-d_i)+X_3K_3$$

The target of the subject is to give consideration to both the maximization of the satisfaction function and the maximization of this objective function.

2.2.2 When M1＜X_1 + X_2

Namely due to the fact that the spare cabins of first class cannot meet the demand of people who have the will to upgrade, those people who have the will to upgrade from the second class to the first class will get a unified price K_1 for upgrade replenishment, those people who have the will to upgrade from the third class to the first class will get a unified price K_2 for upgrade replenishment.

In such case of replenishment:

the individual satisfaction of passengers from the second class to the first class is

$$U(a_i)=\begin{cases}\dfrac{A}{b_i+K_1},(b_i+K_1>A)\\ 1,(b_i+K_1\le A)\end{cases}$$

the individual satisfaction of passengers from the third class to the first class is

$$U(c_i)=\begin{cases}\dfrac{A}{d_i+K_2},(d_i+K_1>A)\\ 1,(d_i+K_2\le A)\end{cases}$$

2.2.2.1 When 450-S + X_2 ＜X_3..

Namely due to the fact that the spare cabins of second class cannot meet the demand of people who have the will to upgrade, the individual satisfaction of passengers from the third class to the first class is $U(e_i)=\begin{cases}\dfrac{B}{K_3+f_i},(k_3+f_i>B)\\ 1,(K_3+f_i\le B)\end{cases}$, at this time the passenger's satisfaction function is:

$$\max U=[T-X_2-X_3]^{j_3}\left[S-X_1+\sum_{i=1}^{x_3}U(e_i)\right]^{j_2}\left[F+\sum_{i=1}^{x_1}U(a_i)+\sum_{i=1}^{x_2}U(c_i)\right]^{j_1}$$

the objective function is: $Y=X_1K_1+X_2K_2+X_3K_3$ $Y = X_1K_1 + X_2K_2 + X_3K_3$

The target of the subject is to give consideration to both the maximization of the satisfaction function and the maximization of this objective function.

2.2.2.2 When 450-S + $X_2 \geq X_3$

Namely due to the fact that the spare cabins of second class cannot meet the demand of people who have the will to upgrade, the satisfaction of passengers is:

$$\max U = \left[T - X_2 - X_3\right]^{j_3} \left[S - X_1 + X_3\right]^{j_2} \left[F + \sum_{i=1}^{x_1} U\left(a_i\right) + \sum_{i=1}^{x_2} U\left(c_i\right)\right]^{j_1}$$

the objective function is: $Y = X_1 K_1 + X_2 K_2 + \sum_{i=1}^{x_3} \left(B - f_i\right)$

The target of the subject is to give consideration to both the maximization of the satisfaction function and the maximization of this objective function.

2.3 Constraint conditions

The constraint conditions of all the above conditions are

$$\begin{cases} M_1 \geq 0 \\ F + X_1 + X_2 \leq 250 \\ S - X_2 + X_3 \leq 450 \\ 450 - S + X_2 \geq 0 \\ T - X_2 - X_3 \geq 0 \\ X_1, X_2, X_3 \geq 0 \\ 0 \leq T \leq 500, 0 \leq F \leq 250, 0 \leq S \leq 450 \end{cases}$$

3. Summary

This model maximizes the expected ticket revenue combined with the self built model of tourists' will of upgrade and the use of upgrade scheme of integer programming.

Main advantages are:

(1) It has more detailed consideration, and more comprehensive classification of the situations.

The existing problems are:

(1) It has a strong theoretical basis, but has not been tested in practical application.

Opinions on improvement:

It can be put into practical application, and supplement or modify the situation classification in accordance with the actual situation.

References

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