Study on the Selection of Educational Tourism Subsidies——A Case Of Educational Tourism From 2000-2007 in China

Tingting Ni[1,2,a], Cheng Liu[3,b], Junyi Wei[1,2,c*]

[1]Business and Tourism School, Sichuan Agricultural University, Chengdu, Sichuan, China
[2]National Forestry and Grassland Southwest Engineering Technology Research Center of Taxus, Chengdu, Sichuan, China
[3]Department of Foundational Courses Dujiangyan Campus, Sichuan Agricultural University, Chengdu, Sichuan, China

[a]2021227020@stu.sicau.edu.cn
[b]1935947661@qq.com,[c*]263734611@qq.com

Abstract. The development of China's educational tourism market restricting its sustainability of financial shortcomings has an apparent policy-oriented feature. We investigate the supply-side subsidy and the two-way subsidy and find: In the choice of subsidy method, the two-side subsidy is more effective when tourists attach importance to knowledge acquisition, but the supply-side subsidy is more effective when tourists value knowledge acquisition a little. Otherwise, no subsidy becomes prominent. In the profit of subsidy policy, base profit and subsidy performance raise as tourists pay attention to product quality and subsidy. We suggest these findings are considered in formulating educational tourism subsidy policies.

Keywords: educational tourism, subsidy policies, study tours

1 Introduction

Adolescent education and psychology are changing for most people around the world [1]. This lets citizens re-emphasize engaging global citizens to take participate in developing and implementing the skills for societal and environmental challenges through experiential education in which educational tourism plays an essential role. China is no exception to the same trend. China has witnessed fast educational tourism growth with an average annual growth rate of 17.25% in tourist arrivals [2]. As one patriotism and traditional revolutionary education form enabling teenagers to receive core literacy education [3].

As a policy-oriented market, the financial support of educational tourism is mainly concentrated in bases that provide services to tourists in China. However, there are serious problems of policy inclination and uneven resource allocation in educational

F. Cao et al. (eds.), *Proceedings of the 2023 5th International Conference on Economic Management and Cultural Industry (ICEMCI 2023)*, Advances in Economics, Business and Management Research 276,
https://doi.org/10.2991/978-94-6463-368-9_41

tourism subsidies, so we should consider how to go for a reasonable plan of expenses with a cap on the subsidy budget.

In this article, we introduce the demand-side subsidy to construct the demand function and the performance function and compare two different subsidy methods including the supply-side subsidy and the two-side subsidy. Considering the characteristics of service products, we investigate the two subsidy methods and aim to answer two important issues: Might be the subsidy policy effective at the moment? Would the two-way subsidy promote the demand more effectively than the supply-side subsidy?

This research makes significant contributions academically and practically. In the academic regard, this research serves as the first attempt to analyze subsidy policies based on the supply chain to investigate the reason for invalid subsidies. In the practical regard, this paper examines the connection between subsidy methods and demands, which might provide inspiration and reference for practitioners and the government.

2 Problem Description and Basic Assumptions

2.1 Model Formulation

This paper constructs an educational tourism supply chain concerning a base and a government by learning the methods from some scholars [4]. The decision order of supplying chain is: Firstly, the government determines the unit cost subsidy for bases, and the unit consumption allowance for tourists according to the target tourism arrivals and the sensitivity coefficient of the subsidy; Next, the base sets the price based on the unit operation and construction cost of bases, the coefficient of knowledge acquisition, and the sensitivity coefficient of product quality; Finally, tourists make decisions based on willingness to pay, consumer utility, and the actual price.

2.2 Parameter Formulation

The parameters defined in this paper have the following meanings: S_B: the unit cost subsidy for bases or the unit supply-side subsidy, $0 \leq S_B \leq 1$; S_F: the unit consumption allowance for tourists or the unit demand-side subsidy, $0 \leq S_F \leq 1$; S: the unit total subsidy, $S = S_F + S_B$; D: demand for educational tourism products; P: the unit price of educational tourism products; C: the unit operation and construction cost of bases, $0 < C \leq 1$; C_t: the cost denoted by $C_t = C - \alpha\sqrt{C}$. U: consumer utility, when $U > 0$, families will choose to participate in educational tourism; v: the family's willingness to pay; α: the coefficient of knowledge acquisition, $0 \leq \alpha < 1$; β: the sensitivity coefficient of product quality, $0 \leq \beta < 1$; γ: the sensitivity coefficient of the subsidy, $0 \leq \gamma < 1$; $\alpha\sqrt{C}$: the knowledge acquisition of educational tourism; $\beta\sqrt{S_B}$: the utility brought by educational tourism product quality; U_g: the government subsidy performance, $U_g \geq 0$; τ: the target tourism arrivals of educational tourism; *: denoted by the optimal in the upper right corner.

3 Properties of Optimal Decisions

This research is based on no subsidy, comparing the two subsidy methods of the supply-side subsidy and the two-way subsidy. Therefore, we establish a model under the two-way subsidy, which can also analyze the other two cases at the same time. In the model, the settings of $\alpha\sqrt{C}$ and $\beta\sqrt{S_B}$ consider that the relationships among these variables are not non-linear, which is reflected in the existing research conclusions [5]. Hence, the Utility Function of tourists is $U = v - P + \alpha\sqrt{C} + \beta\sqrt{S_B} + \gamma S_F$. When $U > 0$, tourists would attend educational tourism, that is $v > P - \alpha\sqrt{C} - \beta\sqrt{S_B} - \gamma S_F$. The demand function of tourists at this time is

$$D = P - \alpha\sqrt{C} - \beta\sqrt{S_B} - \gamma S_F \tag{1}$$

The cost function of the base is $C - S_B$, that the more the unit subsidy is, the less actual cost becomes. Thus, the Total Gain Function of the base is

$$max \ \ \pi = (P - C + S_B)(1 - P + \alpha\sqrt{C} + \beta\sqrt{S_B} + \gamma S_F) \tag{2}$$

Because of $\partial^2\pi/\partial P^2 < 0$, π takes its maximum at $\partial\pi_B/\partial P = 0$, the result being

$$P^* = (1 + C + \alpha\sqrt{C} + \beta\sqrt{S_B} + \gamma S_F - S_B)/2 \tag{3}$$

$$D^* = (1 - C + \alpha\sqrt{C} + \beta\sqrt{S_B} + \gamma S_F + S_B)/2 \tag{4}$$

The result is $\pi^* = (1 - C + \alpha\sqrt{C} + \beta\sqrt{S_B} + \gamma S_F + S_B)^2/2$, that is $\pi^* = 2D^2$. We observe that increasing the demand by one unit will bring more than one unit of profit to the base.

The subsidy income of the government is the amount that the educational tourism demand of tourists has more than the target tourism arrivals of educational tourism. The government's performance is $U_g = D - S \times D$. Thus, we have

$$\max \quad U_g = (1 - C + \alpha\sqrt{C} + \beta\sqrt{S_B} + \gamma S_F + S_B)(1 - S_B - S_F) \tag{5}$$

Where, $U_g \geq 0$ indicates the subsidy policy of the government is efficient, and $D \geq \tau$ suggests the demand for educational tourism is more than the target tourism arrivals of educational tourism. This model constructs a Hessian matrix with U_g, S_B and S_F to determine the optimal decision of the government. Because of $H > 0$ and $\partial^2 U_g/\partial {S_B}^2 < 0$ with $\gamma > 1$, we have

$${S_B}^* = \beta^2/4\,(\gamma - 1)^2 \tag{6}$$

$${S_F}^* = \frac{(\gamma - 1 + C - \alpha\sqrt{C})}{2\gamma} + \frac{\beta^2(3\gamma - 1)}{8\gamma(\gamma - 1)^2} \tag{7}$$

Under the two-side subsidy, when we change the relationship between tourist demand and the target tourism arrivals of educational tourism, we find two thresholds of

C_t, including $1+\gamma+\frac{5\beta^2}{4(\gamma-1)}-4\tau$ and $2\gamma-2\tau+1$, which divide C_t into three levels. These three levels also correspond to three different subsidy modes.

Proposition 1 (Threshold Level 1) $C_t \le 1+\gamma+\frac{5\beta^2}{4(\gamma-1)}-4\tau$.

Proposition 2 (Threshold Level 2) $1+\gamma+\frac{5\beta^2}{4(\gamma-1)}-4\tau < C_t \le 2\gamma-2\tau+1$.

Proposition 3 (Threshold Level 3) $C_t > 2\gamma-2\tau+1$.

Theorem 1. The two-side subsidy is more effective when tourists attach importance to knowledge acquisition. Then the supply-side subsidy is more effective when tourists value knowledge acquisition a little.

Observation 1. π and U_g increases with the increase of β and γ.

4 Numerical Experiments

In this section, we analyze numerically the performance of educational tourism demand under $C_t \le 1+\gamma+\frac{5\beta^2}{4(\gamma-1)}-4\tau$ to analyze influencing factors of the optimal profit by adjusting α, β, and γ.

Horizontal and vertical coordinates are all the cost of the base and the demand for educational tourism in Figure 1. This experiment analyzes five sets of α, including $\alpha=0$, $\alpha=0.3$, $\alpha=0.5$, $\alpha=0.8$, and $\alpha=1$. The numerical experiment results that as α increases, educational tourism demand becomes more, which verified Theorem 1 to some extent. The higher the interest of tourists participating in educational tourism (α becomes more extensive), the more the demand would become.

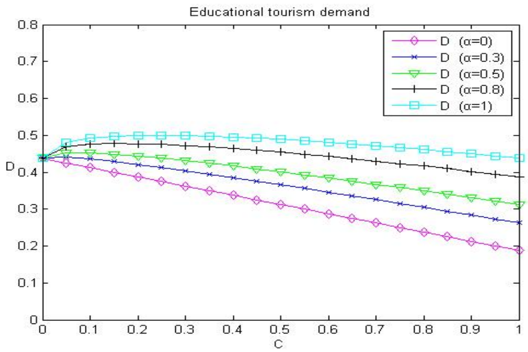

Fig. 1. Educational tourism demand varying the coefficient of knowledge acquisition

The horizontal coordinate is C and the vertical coordinate is the demand for educational tourism in Figure 2 and Figure 3. we can observe the following: Figure 2 proves Observation 1 and Theorem 1(Threshold Level 1), that β promotes demand when tourists concentrate on knowledge acquisition which is the two-side subsidy. In this situation, $\alpha=0.8$, and $\gamma=4$ which means to emphasize subsidizing tourists to carry out the two-way subsidy; Figure 2 also testify to Theorem 1(Threshold Level 3), that no subsidy is the optimal solution as α in a certain range. Changing the value of β

is equivalent to adjusting the importance of the supply-side subsidy. This means no subsidy is more suitable; The remaining three pictures testify to Theorem 1(Threshold Level 2), that the supply-side subsidy is the optimal solution as α in a certain range. With the increase of subsidies for demanders, demand changes negatively. Therefore, it is more suitable to adopt the supply-side subsidy at this time.

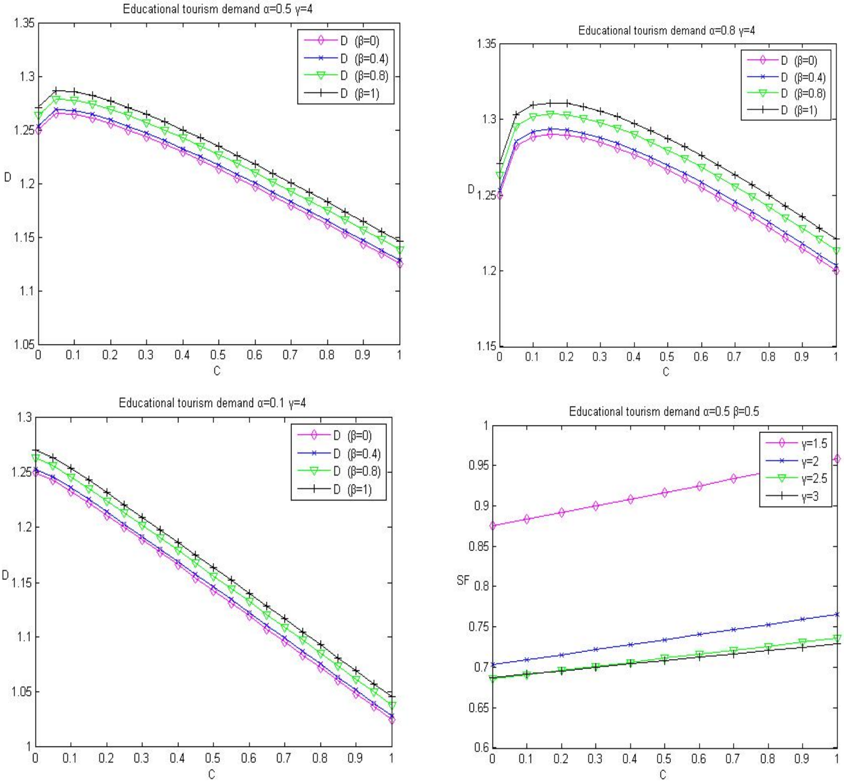

Fig. 2. Educational tourism demand under comparing D by changing α

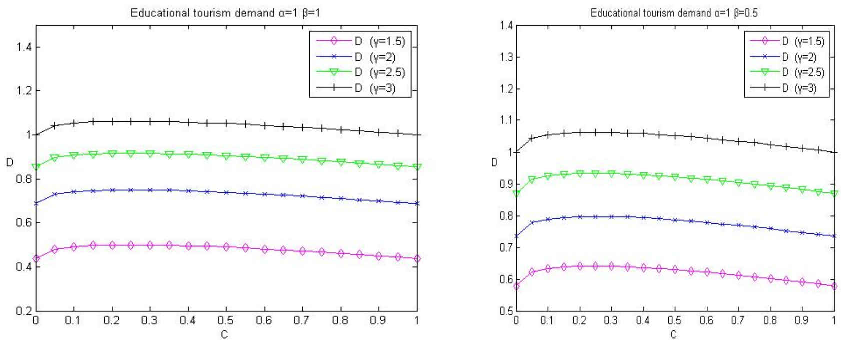

Fig. 3. Educational tourism demand under comparing D by changing β

Figure 3 verifies Observation 1, that the demand increases with the increase of γ. $\beta = 0$ is more effective to improve demand than $\beta = 1$ by comparing (a) and (b), but the impact weakens as the increase of γ. Because add β representative to emphasize the base subsidy and add γ meaning to emphasize the demand subsidy. When tourists have a high sensitivity to knowledge acquisition, it is more effective to adopt the two-way subsidy, which confirms the accuracy of Theorem 1(Threshold Level 1) again. The extent of increase between educational tourism demand and educational tourism product quality is non-linear, which is fast at initial such as γ from 1.5 to 2, but then becomes slow such as γ from 2.5 to 3.

5 Conclusion

This paper studies the question about subsidized objects of subsidy policy under educational tourism managed by the government, a choice that different knowledge acquisition sensitivity, product quality, and subsidy sensitivity.

The paper is the similar to the existing research conclusions, that the funds from the gradual reduction of the demand-side subsidy should be transferred to the supply-side subsidy for research and development [3] in the initial stage. Government should decide to support both the base and the tourist under higher acquisition sensitivity which is usually in the long run time, and choose to support the base individually under lower acquisition sensitivity at the moment. Numbers of countries have relative subsidy policies to support learners to study to a deeper level. One possibility is the form of educational tourism that usually refers to exchange study abroad, such as US and UK, etc. Another is might the form of subsidies, such as the scholarship, etc.

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