Journal of Southeast University (English Edition) Vol. 28, No. 1, pp. 119 – 124 Mar. 2012 ISSN 1003—7985

Service delivery time guarantee decisions with consideration of the time and price sensitive customer

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Abstract: Based on the assumption that the customer is time and price sensitive and price is a piecewise function of the delivery time, a service delivery time guarantee decision model is proposed, and the existence of the optimal service delivery time guarantee L^* is proved. Furthermore, the impact of the correlation parameters on the optimal L^* is analyzed. It is revealed that if the optimal L^* is smaller than the industry level L_0, the service provider with low cost should quote a shorter delivery time, and the service provider should increase the delivery time guarantee under the conditions of the decrease in customer time sensitivity or the increase in the difference of the customer reservation payment. When $L^* > L_0$, the service provider should quote a longer delivery time guarantee and should increase the delivery time guarantee and reduce the price under the conditions of the increase in the customer price sensitivity or the decrease in the mean customer reservation payment.

Key words: reservation payment; service delivery time guarantee; service capacity

doi: 10.3969/j.issn.1003 – 7985.2012.01.020

In modern services, customers have high requirements for the response speed of service providers, and price is no longer the only element of competition among service enterprises. In order to satisfy customer requirements, many enterprises have adopted a strategy of pledging the service delivery time guarantee. For instance, some fast food restaurants promise that the customer waiting time is no more than ten minutes. The service delivery time guarantee includes the customer waiting time and the service time. Service capacity, which is the service speed of the service provider in the service process, is the basis of the service delivery time guarantee. In order to shorten the service delivery time, the service provider should increase its investment on service infrastructure. Therefore, it is necessary to pay attention to the decision process of the service capacity.

Received 2011-10-10.

Biography: Zhang Yulin(1964—), male, doctor, professor, zhangyl@seu.edu.cn.

Foundation item: The National Natural Science Foundation of China (No. 71171046, 70771026).

Citation: Zhang Yulin, Zhang Jianwei, Xue Jin. Service delivery time guarantee decisions with consideration of the time and price sensitive customer[J]. Journal of Southeast University (English Edition), 2012, 28 (1): 119 – 124. [doi: 10.3969/j.issn.1003 – 7985.2012.01.020]

In the last two decades, many studies have been devoted to study the service delivery time guarantee, the service price and the service capacity. In one aspect, some researchers focused on the study of the service delivery time guarantee and the service price under the assumption that the service delivery time guarantee and the service price are independent. Duenyas et al. [1] analyzed the method where the service provider dynamically adjusts the service delivery time guarantee according to the queue congestion. They concluded that when the service capacity has restrictions, the optimal service delivery time guarantee increases with the increase of customers in the queue. So and Song[2] considered the problem that the demand is an exponential function of price and delivery time, and the service capacity is extendable. It is found that a shorter delivery time guarantee should always be quoted with the increase in service capacity, and guaranteeing a shorter delivery time usually results in a larger profit loss than guaranteeing a longer one. The research of Palaka et al. [3] is similar to that of Ref. [2]. But in Ref. [3], the demand is assumed to be a linear function of price and time, and the authors also considered the congestion cost and delay cost. So[4] also studied the price and delivery time competition of several service providers with price and time sensitive demand. In Ref. [4], it is shown that service providers with a higher service capacity should select a short service delivery time and service providers with lower operation costs should select lower prices as their competition strategies; with the increase in customer time sensitivity, the differentiation of service providers' competition strategies become more prominent. Boyaci and Ray[5] studied the delivery time guarantee and price decisions when the service enterprise provides two substitutable services or products. The differences between the two services are in the price and the delivery time guarantee. Their research showed that differentiation of service delivery time decisions was influenced by capacity costs; when the service capacity cost differentiation was the same, higher capacity costs induced less time differentiation and less price differentiation. Liu and Lou[6] investigated a service delivery lead time model based on customer time sensitivity and customer reservation payment. They found that when the customer is very sensitive to delivery time, the decrease in price will not affect the optimal delivery time significantly. Considering the situation where there were one service provider, two queues and two types of customers with different price and time sensitivities, Zhao et al.[7] studied the service price and delivery time guarantee decisions which mainly depended on the number of each type of customer and the service capacity cost.

Some researchers studied the service delivery time guarantee and the service capacity decisions under the assumption that the service delivery time guarantee and the service price are interrelated. Based on the assumption that price is a linear function of delivery time guarantee and the demand function used in Ref. [3], Ray and Jewkes[8] studied the delivery time and capacity decisions. They concluded that when customers are very sensitive to price, the delivery time should be longer and the price should be lower; provided that the service provider does not consider the relationship between price and delivery time, the solution may be the suboptimal. Based on Ref. [8], Liu et al.[9] analyzed the influence of customer waiting time cost on the optimal service delivery time guarantee. They pointed out that the service provider can adjust the relationship between price and delivery time to make customers become less sensitive to time and the service provider obtains more profit. Yang et al.[10] used the method introduced in Ref. [8] to study the delivery time decisions in electronic market.

Moreover, some studies investigated the delivery time guarantee decision in some specific management problems. Shao et al.[11] studied the product delivery time and price decisions in the supply chain. Timothy[12] generalized the existing blanket delivery-time guarantee models. The results indicated that pricing policies are less critical than previously thought when the payment made for late delivery is included as part of the delivery-time guarantee policy. Ching[13] considered a delivery time decision model of multiple make-to-order suppliers. Jayaswal and Jewkes[14] studied a firm selling two services to two different customer segments in a qualifying environment.

To the best of our knowledge, few studies simultaneously consider the effect of the customer behavior and the piecewise service price function. With the motivation of this point, this paper considers the effect of the customer behavior in the decision model, and assumes that price is a piecewise function of the delivery time. This paper tries to propose the decision model, prove the existence of the optimal solution and analyze the impact of the correlation parameters on the optimal solution.

1 Basic Assumptions and Demand Analysis

In this section, several basic assumptions and the problem formulation will be introduced. Let L denote the service delivery time guarantee. The service system is an M/M/1 type queue with a service capacity μ. The priority rule is first-come-first-served (FCFS). Let the mean customer arrival rate be λ. Assume that customers do not balk once they enter the queue. Customer reservation payment V obeys the uniform distribution on the interval $[\underline{V}, \overline{V}]$. The function of customer payment is related to the service price and the delivery time guarantee. In this paper, we denote the function $R(p, L)$ as

$$R(p, L) = ap + bL \qquad a > 0, b > 0 \tag{1}$$

where a and b denote the customer price sensitivity and the customer time sensitivity, respectively.

This paper assumes that the service price is a sub-function of the service delivery time guarantee. The existing studies often assume that price is an increased (or decreased) linear function of the delivery time. However, this assumption is not always applicable in reality. For example, the express enterprises often charge the same price in some specific period. Therefore, this paper proposes several assumptions as follows: if the delivery time guarantee is shorter than the service industry level L_0, the service price is p_0; otherwise, price is a decreased linear function of the delivery time. The price function of the delivery time can be denoted as follows:

$$p(L) = \begin{cases} p_0 & \underline{L} \leqslant L \leqslant L_0 \\ p_0 - z(L - L_0) & L_0 < L \leqslant \overline{L},\ z > 0 \end{cases} \tag{2}$$

where $\underline{L}$ and $\overline{L}$ are respectively the lower and the upper bounds of the service delivery time guarantee. z is a constant and it is used to denote the delivery time sensitivity of the price.

In the following, we will propose the service demand analysis. Substituting Eq. (2) into Eq. (1), the function of the customer payment can be denoted as

$$R(L) = \begin{cases} ap_0 + bL & \underline{L} \leqslant L \leqslant L_0 \\ A + BL & L_0 < L \leqslant \overline{L} \end{cases} \tag{3}$$

where $A = ap_0 + azL_0$, $B = b - az$, $B \neq 0$. Note that, we do not consider the case that $B = 0$, and the demand $R(L)$ is a fixed number.

In the whole process, the service provider is assumed to be the leader who formulates the price and service delivery time guarantee. On the other hand, the customer needs to decide whether or not to accept the service. If the customer reservation payment is no less than the customer payment, the customer accepts it; otherwise, the customer refuses it. In this paper, the mean actual customer arrival rate is denoted as

$$\lambda(R(L)) = \Lambda(1 - F(R(L))) = \begin{cases} \Lambda \dfrac{\overline{V} - ap_0 - bL}{\overline{V} - \underline{V}} & \underline{L} \leqslant L \leqslant L_0 \\ \Lambda \dfrac{\overline{V} - A - BL}{\overline{V} - \underline{V}} & L_0 < L \leqslant \overline{L} \end{cases} \tag{4}$$

where Λ is the mean potential customer arrival rate, and $F(V)$ is the cumulative distribution function of the customer reservation payment V. From the above model, it can be seen that shortening the delivery time needs more investment on service capacity in the case that the demand is fixed. As for an M/M/1 queuing system, the requirement that the probability of meeting the time guarantee for each service provider must be at least α can be written as follows[4]:

$$1 - e^{-(\mu-\lambda)L} \geqslant \alpha \tag{5}$$

In practice, service providers cannot ensure that the time that the customer spends on service does not surpass L and even some service providers may cheat the customers. In order to make sure of a high reliability of the delivery time guarantee, two policies can be adopted: one is giving some compensation to the customer on the condition that the service time surpasses L; the other is increasing the value of α and increasing the reliability of L. In this paper, we take the second method.

2 Model Formulations and Analysis

The objective of this paper is to minimize the profit of the service provider. In the following, we propose the model.

In the case that $\underline{L} \leqslant L \leqslant L_0$,

$$\max_{\mu, L} \pi_1(\mu, L) = (p_0 - r)\lambda(R(L)) - c\mu \tag{6}$$

s. t.

$$1 - e^{-(\mu-\lambda(R(L)))L} \geqslant \alpha \tag{7a}$$

$$p_0 > r, \ \mu > \lambda > 0 \tag{7b}$$

where r is the per unit operation cost.

Proposition 1 When the objective function $\pi_1(\mu, L)$ is optimal, we have

$$\mu(L) = \frac{k}{L} + \Lambda(1 - F(R(L)) \qquad k = -\ln(1-\alpha) \tag{8}$$

Proof Assuming that an optimal solution (p^*, μ^*) requires the constraint (7a) to be a strict inequality, it can be seen that when μ^* decreases, π_1^* increases. Then, (p^*, μ^*) is not the optimal solution. Hence, on the condition that (p^*, μ^*) is an optimal solution, we obtain $1 - e^{-(\mu-\lambda(R(L)))L} = \alpha$. Combining Eq. (4) and $1 - e^{-(\mu-\lambda(R(L)))L} = \alpha$, we can obtain that $\mu(L) = \frac{k}{L} + \Lambda(1 - F(R(L))$, where $k = -\ln(1-\alpha)$.

Substituting Eqs. (4) and (8) into Eq. (6), we obtain

$$\pi_1(L) = (p_0 - r - c)\Lambda \frac{\bar{V} - ap_0 - bL}{\bar{V} - \underline{V}} - c\frac{k}{L} \tag{9}$$

Differentiating with respect to L, we have

$$\pi_1' = \frac{-(p_0 - r - c)b\Lambda}{\bar{V} - \underline{V}} + c\frac{k}{L^2} \tag{10}$$

$$\pi_1'' = -c\frac{2k}{L^3} < 0 \tag{11}$$

It is easy to obtain the optimal solution L_1^*,

$$L_1^* = \min(L_0, L_1), \ L_1 = \sqrt{\frac{ck(\bar{V} - \underline{V})}{(p_0 - r - c)\Lambda b}} \tag{12}$$

Eq. (12) should satisfy $p_0 - r - c > 0$. If $p_0 - r - c \leqslant 0$, Eq. (10) is positive and the optimal solution of $\pi_1(L)$ is L_0. Given L_1^*, we can obtain the optimal service capacity by Eq. (8),

$$\mu_1^* = \frac{k}{L} + \Lambda(1 - F(R(L)) \Big|_{L = L_1^*}$$

The above result shows that the optimal decision for the service provider only needs to satisfy the delivery time guarantee constraint.

In the case that $L_0 \leqslant L \leqslant \bar{L}$, we propose the following decision model:

$$\max_{\mu, L} \pi_2(\mu, L) = (p(L) - r)\lambda(R(L)) - c\mu \tag{13}$$

s. t.

$$1 - e^{-(\mu-\lambda(R(L)))L} \geqslant \alpha \tag{14a}$$

$$p > r, \ \mu > \lambda > 0 \tag{14b}$$

With a similar method in the proof of Proposition 1, we can obtain a similar conclusion. If $\pi_2(\mu, L)$ is optimal, the constraint (14a) must be equal. Substituting it into (13), we have

$$\pi_2(L) = (p_0 + zL_0 - zL - r - c)\Lambda\frac{\bar{V} - A - BL}{\bar{V} - \underline{V}} - c\frac{k}{L} \tag{15}$$

Differentiating with respect to L, we can obtain

$$\pi_2' = -z\Lambda\frac{\bar{V} - A - BL}{\bar{V} - \underline{V}} - B\Lambda\frac{p_0 + zL_0 - zL - r - c}{\bar{V} - \underline{V}} + c\frac{k}{L^2} \tag{16}$$

$$\pi_2'' = 2zB\Lambda\frac{1}{\bar{V} - \underline{V}} - c\frac{2k}{L^3} \tag{17}$$

If $L = L_0$, it results in $\pi_1(L_0) = \pi_2(L_0)$. Then, the range of L can be denoted as $[L_0, \bar{L}]$. Combining the constraint $p > r$ in (14b), we can obtain $L < \frac{p_0 + zL_0 - r}{z}$. In order to obtain a positive profit, $\bar{L}$ should be less than $\frac{p_0 + zL_0 - r}{z}$.

In the following, we will analyze the optimal solution of $\pi_2(L)$, where $L \in [L_0, \bar{L}]$.

If there is no solution in $[L_0, \bar{L}]$ such that $\pi_2' = 0$, then

$\pi_2(L)$ is redundant in $[L_0, \underline{L}]$ and the optimal solution must be at L_0 or $\bar{L}$.

If there exists a solution in $[L_0, \bar{L}]$ such that $\pi_2' = 0$, we propose the following analysis. If $B < 0$, then we have $\pi''_2 < 0$. It means that there is only one solution such that $\pi'_2 = 0$, and only one solution is the optimal solution of $\pi_2(L)$. If $B > 0$, it can be obtained that $\pi_2(L)$ is convex/concave, and $\left(L_0, \sqrt[3]{\frac{ck(\bar{V} - \underline{V})}{zB\Lambda}}\right)$ is an inflection point. In this situation, there are at most two solutions in $[L_0, \bar{L}]$. If there are two solutions, then the smaller one is the optimal solution of $\pi_2(L)$. In the scenario there is only one solution L_2, on the condition that $L_2 \leqslant \sqrt[3]{\frac{ck(\bar{V} - \underline{V})}{zB\Lambda}}$ and L_2 is the optimal solution of $\pi_2(L)$; otherwise, the optimal solution must be at L_0 or $\bar{L}$.

Let L_2^* denote the optimal solution of $\pi_2(L)$ in $[L_0, \bar{L}]$. The optimal profit can be written as

$$\pi(L^*, \mu^*) = \max\left(\pi_1(L_1^*, \mu_1^*),\ \pi_2(L_2^*, \mu_2^*)\right) \tag{18}$$

3 Impact of Parameters on the Optimal Solution

From the analysis in the above section, we can obtain the optimal L^* and μ^* on the condition that the values of other parameters are given. In this section, we try to analyze the impact of parameters on the optimal solution.

Property 1 If $b \leqslant \frac{ck(\bar{V} - \underline{V})}{(p_0 - r - c)\Lambda L_0^2}$ or $c \geqslant \frac{(p_0 - r)\Lambda b L_0^2}{k(\bar{V} - \underline{V}) + \Lambda b L_0^2}$, then the optimal service delivery time L^* is no less than L_0.

Proof From Eq. (12), we can see that when $b \leqslant \frac{ck(\bar{V} - \underline{V})}{(p_0 - r - c)\Lambda L_0^2}$, $L_1^* \geqslant L_0$. The optimal solution of $\pi(L)$ must be in $[L_0, \bar{L}]$. With the same analysis method, if other parameters remain unchanged and $c \geqslant \frac{(p_0 - r)\Lambda b L_0^2}{k(\bar{V} - \underline{V}) + \Lambda b L_0^2}$, L^* must be in $[L_0, \bar{L}]$.

Property 1 indicates that when the customer time sensitivity is relatively small, the service provider should prolong its optimal service delivery time guarantee. In this scenario, decreasing price and increasing delivery time guarantee can increase demand, and the service provider can gain more profits.

The cost of per unit service capacity also has an important impact on the optimal decision. Shortening the delivery time guarantee usually requires the service provider to increase its investment on service capacity. If the demand is fixed, a short delivery time guarantee requires a high service capacity. An increased service capacity may result in a short delivery time and an increase in demand. However, if the cost of the per unit service capacity is high, the income increased from increasing the service capacity is too little to compensate for the cost. Therefore, in this case, the service provider should quote a relatively long service delivery time to guarantee more profits.

Property 2 In the case that $L^* \in (\underline{L}, L_0)$, the results can be described as follows: 1) L^* increases with the decrease in customer time sensitivity; 2) L^* increases with the increase in the cost of per unit service capacity; 3) L^* decreases with the increase in the mean potential customer arrival rate; 4) L^* decreases with the decrease in differentiation in the customer reservation payment and the mean customer reservation payment has no influence on L^*.

Proof From the conclusion in Eq. (12), on the condition that the optimal solution L^* is in $(\underline{L}, L_0)$, we have

$$L^* = \sqrt{\frac{cK(\bar{V} - \underline{V})}{(p_0 - r - c)\Lambda b}} \tag{19}$$

From Eq. (19), we can obtain the partial derivative with respect to b, r, c, Λ. It is easy to prove that $\partial L^*/\partial b < 0$, $\partial L^*/\partial r > 0$, $\partial L^*/\partial c > 0$, $\partial L^*/\partial \Lambda > 0$.

1) $\partial L^*/\partial b < 0$ means that the optimal service delivery guarantee decreases on the condition that the price is fixed, and the customer time sensitivity increases.

2) $\partial L^*/\partial c > 0$, $\partial L^*/\partial r > 0$ indicate the second point in Property 2. If the per unit service capacity cost is relatively high, shortening the delivery time may increase the demand. However, the income increased from increasing the demand is too little to compensate for the cost on increasing the service capacity. Therefore, the service provider should prolong service delivery time on the condition that the per unit service capacity cost is relatively high. If the price is fixed, and the per unit operating cost of the service provider is high, the marginal profit will be at a low level. The increasing demand only leads to little income increasing. So with the increase in the per unit operation cost, the service provider should increase the delivery time guarantee.

3) $\partial L^*/\partial \Lambda > 0$ indicates that the service provider can shorten the delivery time to attract more customers when the potential customer arrival rate is high. Besides, we can also see that the customer price sensitivity has no influence on the optimal service delivery time.

4) The impact of the customer reservation payment on L^* can be analyzed in two aspects. In the first aspect, we analyze the impact of the mean customer reservation payment on L^*. From Eq. (19), keeping $\bar{V} - \underline{V} = \beta$ unchanged and simultaneously increasing or decreasing $\bar{V}$, $\underline{V}$ has no impact on L^*. The other aspect is the impact of differentiation in the customer reservation payment on L^*. Keeping $(\bar{V} + \underline{V})/2 = \gamma$ unchanged, from Eq. (19), we can obtain $\partial L^*/\partial \bar{V} > 0$. The above analysis indicates

that when the price is fixed, the mean customer reservation payment has no influence on the optimal service delivery time guarantee. However, with the increase in differentiation in the customer reservation payment, the optimal service delivery time guarantee increases. If the customer reservation payment differentiation is very large, the service provider should adopt a relatively long service delivery time guarantee.

Property 3 If $L^* \in (L_0, \bar{L})$, then we have: 1) The optimal solution L^* increases with the increase in customer price sensitivity; 2) The optimal solution L^* increases with the increase in per unit operation cost or service capacity cost; 3) If the mean potential customer arrival rate increases and customers are more sensitive about time, L^* should be shortened; 4) The optimal solution L^* decreases with the increase in the mean customer reservation payment.

Proof If the optimal solution L^* is in $(L_0, \bar{L})$, then we have $\pi_2''(L^*) = 2zB\Lambda \dfrac{1}{\bar{V}-\underline{V}} - c\dfrac{2k}{L^{*3}} < 0$. In order to make sure that $\pi(L^*, \mu^*)$ is positive, we can obtain the constraint $p_0 + zL_0 - zL^* - r - c > 0$ from Eq. (15).

Let $\pi_2'(L^*) = 0$ and differentiate with respect to a, b, and then we obtain

$$\frac{\partial L^*}{\partial a}\left(\frac{2B\Lambda z}{\bar{V}-\underline{V}} - c\frac{2k}{L^{*3}}\right) = -z\Lambda\frac{p_0 + zL_0 - zL^* - r - c}{\bar{V}-\underline{V}} - z\Lambda\frac{p_0 + zL_0 - zL^*}{\bar{V}-\underline{V}} \tag{20}$$

$$\frac{\partial L^*}{\partial b}\left(\frac{2B\Lambda z}{\bar{V}-\underline{V}} - c\frac{2k}{L^{*3}}\right) = \Lambda\frac{p_0 + zL_0 - 2zL^* - r - c}{\bar{V}-\underline{V}} \tag{21}$$

From Eq. (20), we can obtain $\partial L^*/\partial a > 0$.

$\partial L^*/\partial a > 0$ indicates that the service provider should adopt a relatively long service delivery time guarantee in the case that the customer is sensitive to service price, and their time sensitivity is relatively low. Hence, increasing the service delivery time and decreasing the price will attract more customers and gain more profits.

With the same method, differentiating with respect to c, r, Λ, we have

$$\frac{\partial L^*}{\partial c}\left(\frac{2B\Lambda z}{\bar{V}-\underline{V}} - c\frac{2k}{L^{*3}}\right) = -\frac{B\Lambda}{\bar{V}-\underline{V}} - \frac{k}{L^{*2}} \tag{22}$$

$$\frac{\partial L^*}{\partial r}\left(\frac{2B\Lambda z}{\bar{V}-\underline{V}} - c\frac{2k}{L^{*3}}\right) = -\frac{B\Lambda}{\bar{V}-\underline{V}} \tag{23}$$

$$\frac{\partial L^*}{\partial \Lambda}\left(\frac{2B\Lambda z}{\bar{V}-\underline{V}} - c\frac{2k}{L^{*3}}\right) = B\frac{p_0 + zL_0 - zL^* - r - c}{\bar{V}-\underline{V}} + z\frac{p_0 + zL_0 - zL^*}{\bar{V}-\underline{V}} \tag{24}$$

From Eq. (22), if $B > 0$, then we have $\partial L^*/\partial c > 0$. $B > 0$ indicates the customer is very sensitive to delivery time, and $B < 0$ means that the customer is not sensitive to delivery time but to price. So if the customer is sensitive to time and the service capacity cost is high, the service provider should quote a relatively long service delivery time guarantee.

From Eq. (23), if $B > 0$, then $\partial L^*/\partial r > 0$; if $B < 0$, then $\partial L^*/\partial r < 0$. On the one hand, if the customer is very sensitive to time and the per unit operation cost is high, a relatively long delivery time guarantee is better. On the other hand, if the customer is very sensitive to price, and the per unit operation cost is at a high level, the service provider should adopt a relatively short delivery time guarantee.

From Eq. (24), when $B > 0$, we have $\partial L^*/\partial \Lambda < 0$, which indicates that when the customer is very sensitive to time and the mean potential customer arrival rate is high, the optimal service delivery guarantee will be relatively short.

The analysis of the impact of the customer reservation payment on L^* is similar to the analysis in Property 2. Keeping $\bar{V} - \underline{V} = \beta$ unchanged and differentiating with respect to $\bar{V}$, we obtain

$$\frac{\partial L^*}{\partial \bar{V}}\left(\frac{2z\Lambda B}{\beta} - c\frac{2k}{L^{*3}}\right) = \frac{z\Lambda}{\beta} \tag{25}$$

From Eq. (25), we can obtain $\partial L^*/\partial \bar{V} < 0$.

The increase in $\bar{V}$ indicates that the mean customer reservation payment becomes larger, and the customer can accept a relatively high price or a long delivery time guarantee. In this case, shortening the delivery time guarantee can increase the service price and gain more profits. On the condition that the mean customer reservation payment is relatively large, the service provider should adopt a relatively short service delivery time guarantee and the service price is relatively high.

4 Conclusion

In this study, a service delivery time guarantee cost decision model is proposed with the consideration that customers are sensitive to time and price, and price is a subfunction of delivery time. Furthermore, the existence of the optimal solution is proved, and the impact of the correlation parameters on the optimal delivery time guarantee is analyzed. From our study, it can be concluded that service providers should pay attention to the customer characteristics and the service cost in the processing of making their delivery time decisions; per unit operation costs and service capacity costs have a significant impact on the delivery time decision; the differentiation in the customer reservation payment and the mean customer reservation payment also have influences on the optimal decisions.

This paper assumes that all the customers have the same price and time sensitivity. However, in practice, the time and price sensitivities of different customers sometimes are different. Therefore, in future research it is worth investigating the delivery time decision problem with different types of customers.

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考虑具有时间与价格敏感性顾客的服务商承诺时间决策

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摘要:基于顾客具有时间与价格敏感性和服务价格是服务承诺时间的分段函数前提假设下,建立了相应的服务承诺时间决策模型,并证明了最优服务承诺时间 L^* 的存在性,分析了相关参数对 L^* 的影响. 研究发现:当 L^* 小于行业水平 L_0 时,低成本服务商应声明较短的服务承诺时间;随着顾客时间敏感系数的减小或顾客之间保留支付差异的增大,服务商应延长服务承诺时间. 当 $L^* > L_0$ 时,服务商应声明较长的服务承诺时间;随着顾客价格敏感系数的增大或顾客平均保留支付的减小,服务商应延长服务承诺时间,并降低价格.

关键词:保留支付;服务承诺时间;服务能力

中图分类号:F719