Cost/Benefit Model Development of Service Management with Profit Design

考量利潤設計之服務管理之成本效益模式發展

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信用交下需求和價格有關且提供貨品鑑賞期之預購系統

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摘要: 隨著全球化的市場趨勢, 企業面臨激烈的競爭, 爲了保持競爭優勢及獲取最大利潤, 零售商提供更好的服務留住顧客或吸引更多的顧客以提高其競爭力及市場佔有率。現今常見零售商提供七天鑑賞期給顧客, 於此期間內, 若顧客不滿意皆可無條件退貨。預售是零售業中常見的銷售方式, 以預售的方式銷售貨品使零售商多了一段預售期間, 將使得整個銷售週期延長, 預售期間不需要馬上交貨且由預購訂單所產生的訂金收入將產生利息收入, 提高零售商的利潤。另一方面, 供應商經常提供零售商一段延遲付款期間以吸引更多將延遲付款視爲一種價格折扣的顧客。本計畫考慮供應商提供零售商延遲付款的優惠且零售商提供預售給其顧客並允許顧客對產品不滿意時, 在鑑賞期內可提供無條件退貨的服務, 且市場需求和貨品售價有關。首先, 建立零售商適當的存貨模型並發展出一個簡單且易於使用的方法協助零售商在利潤極大化的情況下決定其最適的單位貨品銷售價格及最適的銷售期間長度。接著, 將以數值範例說明整個求解過程。

關鍵字: 存貨、延遲付款、預售、退貨、財務。

考量利潤設計之服務管理之成本效益模式發展

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摘要: 本研究發展成本效益模式, 以整合服務管理與考量利潤設計於相關流程。效益應藉由服務管理之投資與使用利潤設計的方法, 合適地分配於服務符合與服務改善方面。在考量各服務構面後, 顧客認知與顧客期望可被使用於量化服務水準。服務水準之改善可增加服務需求, 服務水準之投資亦被考量, 而相關成本與效益亦被獲得。本模式可使決策者在投資前預測考量利潤設計之服務管理之成本與效益。

關鍵字: 服務管理、服務認知、服務期望、投資、利潤設計。

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Cost/ Benefit Model Development of Service Management with Profit Design

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Abstract

In this research, the cost/ benefit model will be developed to integrate service management with profit design on relevant processes. The profit should be properly allocated on service conformance and service improvement by the investments in service management and using the approach of profit design. The customer perception and customer expectation can be used to quantify the service level after considering each service dimension. The service demand will be then increasingly affected by the improvement in service level. The investment in service level can be also considered and relevant cost and benefit are obtained. The model can be used for the decision makers to predict the cost/ benefit of service management with profit design before the investment.

Keywords: Service management, service perception, service expectation, investment, profit design.

1. Introduction

The Parasuraman et al. [23, 24] constructed the dimensions of service quality and the gap between service expectation and service perception, and the service strategy was required for improving market share. Lewis and Booms [19] considered that service quality could be linked with profit. Since the service was crucial for customer retention, the concept of service profit design about service process and service performance was studied (Baron et al. [1], Gronroos [9, 11], Lovelock [20], Lovelock et al. [21], Rust et al. [27]). Gummesson [13] mentioned that the consumption behavior, amount, and frequency of customers could be affected by the service to integrate customer orientation. Kwortnik and Thompson [15] studied that the service innovation could improve the market share. The service could create service value and affect consumption behavior to improve the profit (Brodie [3], Vargo [28], Lusch and Vargo [22], Vargo and Lusch [29]). Lee [16, 17] presented that the consideration of profit design could be affected by service management. Bolton and Drew [2] described that service experience would affect service performance, and then result in service quality and service value. A multistage assessment was presented, but the mathematic model was not much developed.

The service is intangible and crucial for customer satisfaction. The customer-oriented strategy to strengthen the customer service is mentioned in most of the service industries. The service should be improved by having the mutual communication with customers, enhanced service dimensions, acceptable price, and satisfactory service perception (Gronroos [10]). The purchase intention can be reflected from the service demand with increased purchase frequency and purchase volume. The service can be evaluated by studying the effect of service on customer satisfaction, and thus link to customer loyalty. The customer service value can be also studied (Gronroos and Ravald [12]). On one hand, the crucial service dimensions may be obtained in most of the study of conducting the questionnaire related to service, but the effect of service on service demand and relevant mathematical model were developed in few researches. On the other hand, customer perception should be also improved to enhance service level by some financial amount of investment in service level. Guo and Dooley [14] mentioned that the improvement processes should be under mathematical control. In this research, the cost/ benefit model will be developed to integrate service management with profit design on relevant processes. The profit should be properly allocated on service conformance and service improvement by the investments in service management and using the approach of profit design. The model can be used for the decision makers to predict the cost/ benefit of service management with profit design before the investment (Chakravorty [5], Glock and Jaber [8], Lee [18]).

The investment model development in service level is shown in Figure 1. The investment can be linked with customer perception and customer expectation which are the main component of service level for each service dimension. The service weight can be evaluated upon the service level for each dimension to result in service level for all service dimensions. The service level then affected the service demand. In addition, the price can be also considered to analyze the join relationship among service level, price, and service demand. The service cost is then included to obtain the profit. As the service level is increased corresponding to the investment in service level for each service dimension, total profit can be then enhanced.

2. Cost/ Benefit Model Development of Service Management

Most of time, customer perception and customer expectation are analyzed by conducting the questionnaire for the service items. The critical service items may then be obtained. In this research, the relationship and the effect of service items on the service level are considered since the customers care about the service results and service improvement. The service perception compared with service expectation can be used to derive the relationship service perception and service level.

2.1 Service perception and service level

Bolton and Drew [2] mentioned the difference between customer perception and customer expectation. As the customer perception was less than customer expectation,

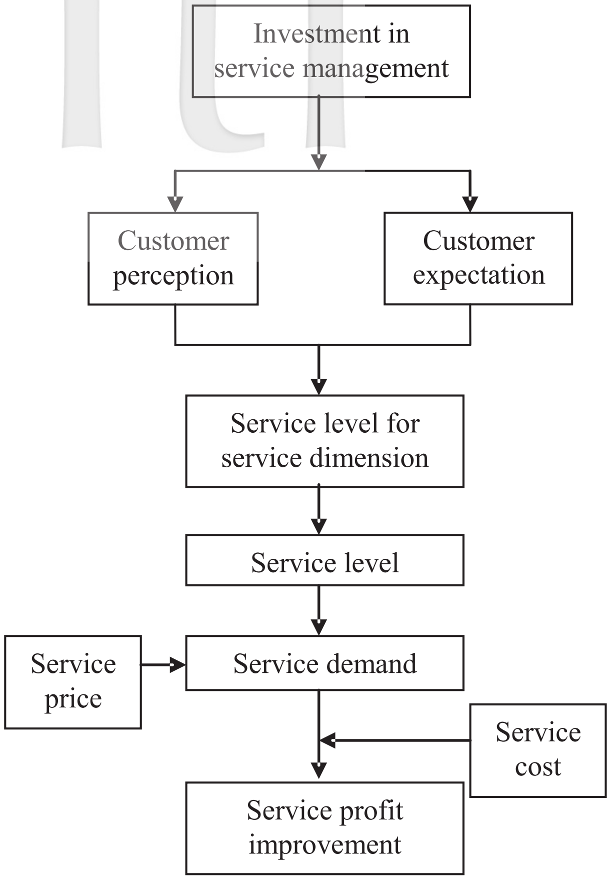

Figure 1: The investment model development in service level.

the customer would have the feeling of dissatisfaction with the service. On the other hand, as the customer perception was more than customer expectation, the customer could be satisfied with provided service. In this research, let the service level for service dimension i, S_i, be the value by comparing customer perception (P_i) with customer expectation (E_i), and can be obtained as the ratio between customer perception and customer expectation. That is,

$$S_i = \text{Min}\left\{\frac{P_i}{E_i}, 1\right\}. \tag{2.1}$$

As the customer perception P_i is less than customer expectation E_i, the customer will not be satisfied with the service item i corresponding to the service level P_i/E_i only. Instead, as the customer perception is more than customer expectation, the service is completely satisfied with the service item with respect to the service level 100%, For instance, as there are customer perception $P_i = 3$ and customer expectation $E_i = 5$ by using Likert scale ranged from 1 to 5, the service level for service dimension i will be $S_i = 3/5$.

There are n service dimensions, and the service for each service item can be differently weighted. For example, five service dimensions including cleanness, hospitality, accuracy, maintenance, and speed can be weighted with the service score 10%, 30%, 20%, 15% and 25% respectively. The weight for each service dimension can be evaluated by some analytic hierarchy process method or other priority methods (Calabrese [4]).

As per (2.1), the weight for each service dimension can be multiplied with the service level for each service dimension, thus the service level after considering all service dimensions can be obtained.

The service level, S, will then be formed as

$$S = \sum_{i=1}^{n} w_i S_i, \tag{2.2}$$

where w_i is the weight for service dimension i for $i = 1, 2, \ldots, n$, and

$$\sum_{i=1}^{n} w_i = 1.$$

2.2. Service level and service demand

After the service level S is obtained, the service demand should be affected. Bolton and Drew [2] presented that the discrepancy between expected and perceived service can result in customer satisfaction or dissatisfaction. They presented that the difference between customer perception and customer expectation affect service conformance. In this research, as the service level is composed of service perception and service expectation, the resulted customer satisfaction situation can be reflected on the service demand. Fine and Porteus [6] studied the model of the process improvement and Porteus [26, 27] analyzed the relationship between the quality conformance and cost. He presented that the performance could be enhanced as the conformance of quality was improved. In this paper, the service demand can be increasingly changed as the service level is improved.

The service demand, D, can be affected by service level, S. It can be obtained as

$$D = a + b\ln(S), \tag{2.3}$$

where a and b are the constant value.

If the service is at original service level, the service demand remains the same. As the original service level S_0 is corresponding to the service demand D_0 before service improvement, the constant value, a, can be obtained as

$$a = D_0 - b\ln(S_0). \tag{2.4}$$

The relationship between the service demand and service level can be shown as Figure 2. As the service level is not improved, the service demand is not changed. As the service level is increased, the service demand is positively increased. As the service level is much changed, the service demand is exceedingly increased.

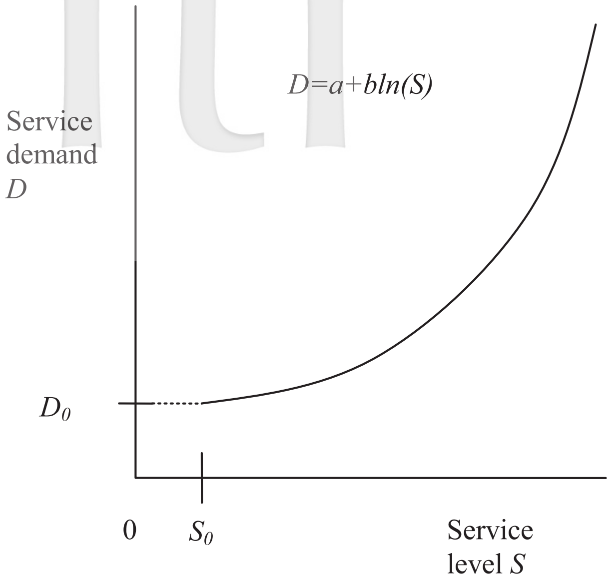

Figure 2: The relationship between the service demand and service level.

2.3. Service cost and profit

Let R be the price for each service demand unit. The demand can be also affected by the price. As the price is increased, the demand will be decreased. The demand can be modified and written as (Glickman and Berger [7])

$$D(P) = K_1 P^{-d}, \tag{2.5}$$

where K_1 and d are the constant.

As per (2.3) and (2.5), the service demand after considering the price and service level can be then rewritten as

$$D = K_1 R^{-d} \times (a + b\ln(S)). \tag{2.6}$$

Thus, the service demand from (2.6) can be multiplied with the price R, and the total sales will be then simplified as

$$T_S = K_1 R^{1-d} \times (a + b\ln(S)). \tag{2.7}$$

The variable cost per service demand unit is denoted as v. Then, the total profit, T_p, will be obtained as

$$T_p = R \times D - v \times D. \tag{2.8}$$

As per (2.2), (2.4), (2.6), and (2.8), the total profit without the investment in service improvement will be obtained as

$$T_p = (R - v) \times K_1 R^{-d} \times \left\{ D_0 - b\ln(S_0) + b\ln\left(\sum_{i=1}^{n} w_i S_i\right)\right\}. \tag{2.9}$$

2.4 The investment in service level

Let the investment in service improvement for service dimension i be denoted as $I(S_i)$, and can be modified as (Porteus [26])

$$I(S_i) = \alpha_i + \beta_i \ln(S_i), \tag{2.10}$$

where

$$\alpha_i = -\beta_i \ln(S_{i0}) \tag{2.11}$$

and S_{i0} is the original service level for service dimension i since the service level for service dimension i will remain at the original level without any investment in the service improvement for service dimension i.

The total investment in service improvement can then be obtained as

$$\begin{aligned} TC_I &= \sum_{i=1}^{n} I(S_i) = \sum_{i=1}^{n} \{\alpha_i + \beta_i \ln(S_i)\} \\ &= \sum_{i=1}^{n} \{-\beta_i \ln(S_{i0}) + \beta_i(S_i)\} \\ &= \sum_{i=1}^{n} \{\beta_i \ln(S_i/S_{i0})\} \end{aligned} \tag{2.12}$$

2.5 The profit after the investment in service level

As per (2.9) and (2.12), the total profit after the investment in service improvement will be

$$\begin{aligned} T_p &= (R-v) \times K_1 R^d \times \left\{ D_0 - b\ln(S_0) + b\ln\left(\sum_{i=1}^{n} w_i S_i\right)\right\} - TC_1 \\ &= (R-v) \times K_1 R^d \times \left\{ D_0 - b\ln(S_0/\sum_{i=1}^{n} w_i S_i)\right\} - \sum_{i=1}^{n} \{\beta_i \ln(S_i/S_{i0})\}. \end{aligned} \tag{2.13}$$

2.6 Solution steps

The model can be solved to obtain the optimal or suitable service level for each service dimension in order to obtain the optimal or proper service demand and profit with proper allocation of investments in service improvement. The solution steps can be presented as the following:

(1) Customer perception P_i and customer expectation E_i are obtained by using Likert scale ranged from 1 to 5 for service dimension i.

(2) As per (2.1), the service level for service dimension i , S_i, can be computed.

(3) Use AHP (Analytic Hierarchy Process) approach or other evaluation methods to obtain the weight for service dimension i, w_i.

Table 1: AHP matrix for service.

Service	Cleanness (A)	Quality (B)	Attitude (C)
Cleanness (A)	1	2	4
Quality (B)	1/2	1	1/2
Attitude (C)	1/4	2	1
Total of column	7/4	5	11/2

(4) As per (2.2), the original service level after considering all service dimensions, S_0, is obtained.

(5) As per (2.4), the parameter b is given to obtain the parameter a under the original service demand D_0 and the original service level S_0.

(6) As per (2.6), the service demand D can be obtained corresponding to the service level S and the price R.

(7) As per (2.7), the sales, T_s, can then be obtained.

(8) As per (2.9), the total profit without the investment in service improvement, T_p, will be obtained as the variable cost per service demand unit, v, is given.

(9) As per (2.10), the investment in service dimension i is obtained corresponding to improved service level S_i as the constant α_i is obtained and β_i is given corresponding to the original service level for service dimension i, S_{i0} as per (2.11).

(10) The service level for service dimension i after the improvement, S_i, corresponding to improved customer perception, P_i, can be obtained as per (2.1).

(11) As per (2.12), total investment in service improvement, TC_I, is obtained.

(12) As per (2.9) and (2.12), the total profit after the investment in service improvement, T_P, is then obtained.

(13) As per (2.2), the service level after the investment in service, S, is obtained.

(14) As per (2.6), the service demand after the investment in service improvement, D, is obtained.

3. Numerical Example

A numerical example is presented to illustrate the model developed in this paper. The optimum values of the service level for each service dimension are obtained. The investments in service improvement and relevant costs and profit for all service dimensions are also obtained. Customer perception P_i and customer expectation E_i are obtained by using Likert scale ranged from 1 to 5 for service dimension i. Suppose that there are three service dimensions including cleanness, quality, and attitude. The weight for each service level can be obtained by using AHP (Analytic Hierarchy Process) approach (Calabrese et al. [4]), and is shown as Table 1 and 2. Thus, the weight for service dimension 1, 2, and 3 can be w_1, w_2, and w_3 respectively.

Table 2: The weight of AHP for service.

Service	(A)	(B)	(C)	Total of Row	Priority (Weight, w_i)
(A)	4/7	2/5	8/11	1.7	56.7%
(B)	2/7	1/5	1/11	0.58	19.3%
(C)	1/7	2/5	2/11	0.72	24%

Table 3: Original parameter values.

Service Dimension i	P_i	E_i	S_{i0}	β_i	α_i
1	2	4	0.5	200	138.63
2	3	4	0.75	3000	863.05
3	2.5	4	0.625	1500	705.01

Table 4: The relevant results after the improvement in service management.

T_p (\$)	$P1$	$P2$	$P3$	$S1$	$S2$	$S3$	S	$I(S1)$ (\$)	$I(S2)$ (\$)	$I(S3)$ (\$)
2612789	2.0	3.0	2.5	0.50	0.750	0.625	0.578	0.00	0.00	0.00
2626109	2.2	3.1	2.6	0.55	0.775	0.650	0.617	19.06	98.37	58.83
2636098	2.4	3.2	2.7	0.60	0.800	0.675	0.657	36.46	193.62	115.44
2643270	2.6	3.3	2.8	0.65	0.825	0.700	0.696	52.47	285.93	169.99
2648045	2.8	3.4	2.9	0.70	0.850	0.725	0.735	67.29	375.49	222.63
2650775	3.0	3.5	3.0	0.75	0.875	0.750	0.774	81.09	462.45	273.48
*2651751	3.2	3.6	3.1	0.80	0.900	0.775	0.813	94.00	546.96	322.67
2651220	3.4	3.7	3.2	0.85	0.925	0.800	0.852	106.12	629.16	370.29
2649388	3.6	3.8	3.3	0.90	0.950	0.825	0.892	117.55	709.16	416.45
2646432	3.8	3.9	3.4	0.95	0.975	0.850	0.931	128.37	787.09	461.23
2642500	4.0	4.0	3.5	1.00	1.000	0.875	0.970	138.63	863.05	504.71

The service weight for service dimension 1, 2, and 3 can be 56.7%, 19.3%, and 24% respectively. It shows that the service dimension 1 occupies the top priority among all service dimensions. All service dimensions are required, but the customers care more about the performance of the service dimension 1.

Let the price R and variable cost v for the service be \$150 and \$50 per service demand unit respectively. Let the constant $K_1 = 12000$, $d = 1.5$, and $b = 3000$ be given. The original service demand D_0 is 4000 units. The values assumed for the original parameters are given in Table 3. The original service level can be obtained to be $S_0 = 0.57825$. The original parameter values are shown in Table 3.

The relevant results after the improvement in service management are shown in Table 4. The note $*$ is to show the optimal profit with proper combination service level, customer perception, and the investment for each service dimension.

The selected optimal values after the investments in service improvement are then obtained and shown in Table 5. The relationship between service level, S, and total profit, T_p, is shown in Figure 3. As the service level after the improvement comes up to 0.813, it will result in optimal amount of total profit \$2,651,751.

Table 5: The selected optimal values after the investment in service.

Service Dimension i	P_i	S_i	$I(S_i)$
1	3.2	0.8	\$94.00
2	3.6	0.9	\$546.96
3	3.1	0.775	\$322.67

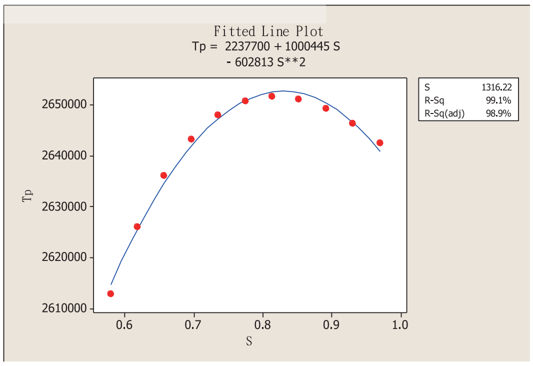

Figure 3: The relationship between the service level and total profit.

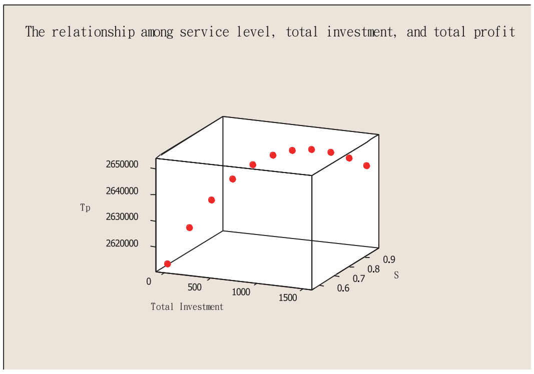

Figure 4: The relationship among total investment, service level, and total profit.

The relationship among total investment, service level, and total profit is then shown in Figure 4.

In summary, the customer perception for service dimension 1, 2, and 3 after the improvement in service will be 3.2, 3.6, and 3.1 improved from 2.0, 3.0, and 2.5 respectively. The service demand after the improvement in service becomes 26,517 service units. The corresponding service level for service dimension 1, 2, and 3 after the investment in service level will be 0.8, 0.9, and 0.77 improved from 0.5, 0.75, and 0.625 respectively by the investment amount \$94.00, \$546.96, and \$322.67 in service dimension 1, 2, an 3. The service level after the improvement becomes 0.813, which will result in total profit \$2,651,751. The service level is enhanced and total profit is much improved after the investments in all service dimensions, and the service demand is increased. The proper allocation of profit is also designed for each service dimension with the investment in service improvement for service processes.

The regression analysis can be further used to analyze the relationship among the service level for each dimension, the investment in service level for each dimension, and total profit.

(1) Total profit and all service and the investments The stepwise regression in Table 6

Table 6: Stepwise Regression: T_p versus S1, S2, S3, I(S1), I(S2), I(S3)
Alpha-to-Enter: 0.15 Alpha-to-Remove: 0.15.

Step	1	2
Constant	2625741	3343131
I(S1)	208.3	1967.8
T-Value	3.67	213.24
P-Value	0.005	0.000
S2		-973615
T-Value		-191.55
P-Value		0.000
S	8190	128
R-Sq	59.99	99.99
R-Sq(adj)	55.55	99.99

shows that total profit, T_p, can be significantly affected by the investment in service level for service dimension 1, I(S1), and the service level for dimension 2, S2.

Table 7: Regression Analysis: T_p versus S1, S2, S3, I(S1), I(S2), I(S3)
* S2 is highly correlated with other X variables.
* S2 has been removed from the equation.
* S3 is highly correlated with other X variables
* S3 has removed from the equation.

The regression equation is

$$T_p = 2511002 + 203560S1 + 1045I(S1) - 3828I(S2) + 6117I(S3)$$

Predictor	Coef	SE Coef	T	P
Constant	2511002	57264	43.85	0.000
S1	203560	114537	1.78	0.126
I(S1)	1044.6	263.1	3.97	0.007
I(S2)	-3828.2	761.7	5.03	0.002
I(S3)	6117	1261	4.85	0.003

$S = 16.3175$ $R - Sq = 100.0\%$ $R - Sq(adj) = 100.0\%$

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	1509160467	377290117	1416992	0.00
Residual Error	6	1598	266		
Total	10	1509162064			

The regression of total profit versus service level 1, 2, and 3, and the investment in service level 1, 2, and 3 is shown in Table 7. It shows that the service level 1 can be kept to illustrate total profit instead of using service level 2 and 3. The investments for all service dimensions can also significantly affect total profit.

(2) Total profit and the service level for each service dimension

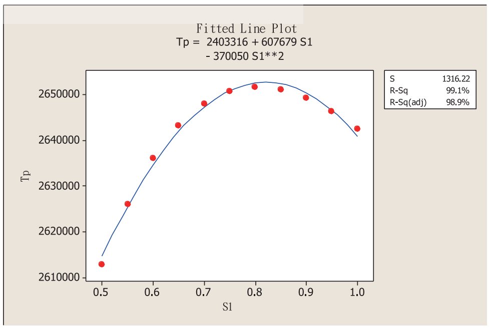

Figure 5: The relationship between service level 1 and total profit.

Table 8: Polynomial Regression Analysis: T_p versus S1.

The regression equation is

$$T_p = 2403316 + 607679S1 - 370050S1 * *2$$

$$S = 1316.22 \quad R - Sq = 99.1\% \quad R - Sq(adj) = 98.9\%$$

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	1495302493	747651247	431.56	0.000
Error	8	13859571	1732446		
Total	10	1509162064			

The regression analysis in Figure 5 and Table 8 shows that the service level for service dimension 1 can significantly affect total profit. The regression analysis in Figure 6 and

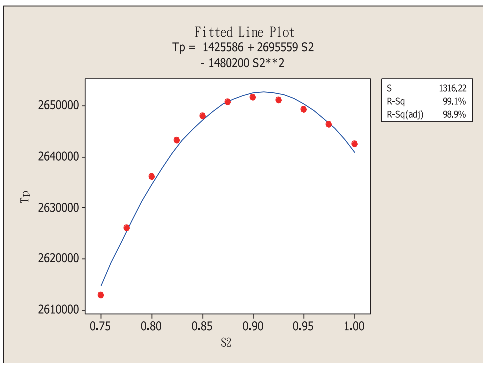

Figure 6: The relationship between service level 2 and total profit.

Table 9: Polynomial Regression Analysis: T_p versus S2.
The regression equation is
$$T_p = 1425586 + 2695559S2 - 1480200S2 **2$$
$$S = 1316.22 \quad R - Sq = 99.1\% \quad R - Sq(adj) = 98.9\%$$
Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	1495302493	747651247	431.56	0.000
Error	8	13859571	1732446		
Total	10	1509162064			

Table 9 shows that the service level for service dimension 2 can significantly affect total profit.

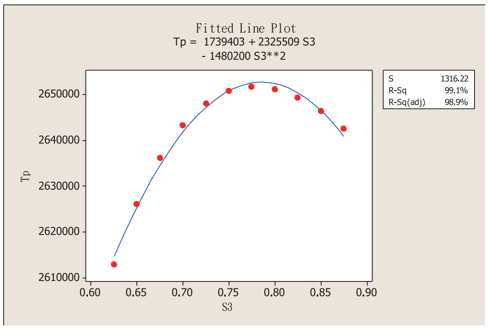

Figure 7: The relationship between service level 3 and total profit.

Table 10: Polynomial Regression Analysis: T_p versus S3.
The regression equation is
$$T_p = 1739403 + 2325509S3 - 1480200S3 **2$$
$$S = 1316.22 \quad R - Sq = 99.1\% \quad R - Sq(adj) = 98.9\%$$
Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	1495302493	747651247	431.56	0.000
Error	8	13859571	1732446		
Total	10	1509162064			

The regression analysis in Figure 7 and Table 10 shows that the service level for service dimension 3 can significantly affect total profit.

(3) Total profit and the investment in service level for each service dimension

The investment in the service level for each service dimension can affect the total profit. The investment can be properly allocated for each service dimension. As for the investment in service level, the investment in service level for service dimension seems more efficient than other service dimensions. The investment in the service level for service dimension 2 is requires to attain the optimal status of total profit.

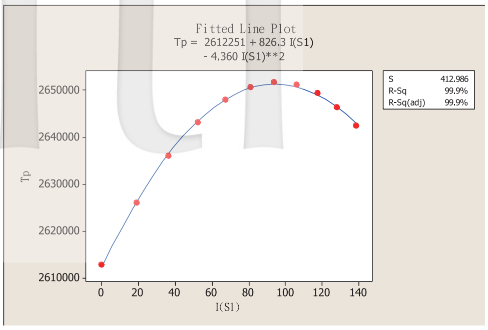

Figure 8: The relationship between the investment in service level for service dimension 1 and total profit.

Table 11: Polynomial Regression Analysis: T_p versus I(S1).

The regression equation is

$$T_p = 2612251 + 826.3I(S1) - 4.360I(S1) * *2$$

$$S = 412.986 \quad R - Sq = 99.9\% \quad R - Sq(adj) = 99.9\%$$

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	1507797608	753898804	4420.21	0.000
Error	8	1364457	170557		
Total	10	1509162064			

Sequential Analysis of Variance

Source	DF	SS	F	P
Linear	1	905408459	13.50	0.005
Quadratic	1	602389148	3531.89	0.000

The regression analysis in Figure 8 and Table 11 shows that the investment in service level for service dimension 1 can significantly affect total profit.

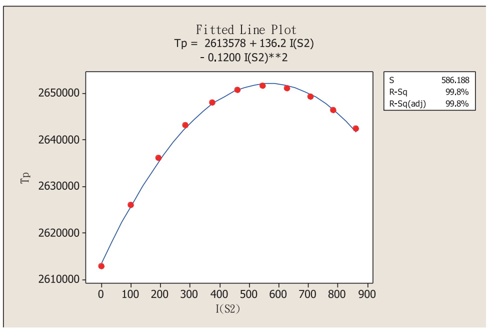

Figure 9: The relationship between the investment in service level for service dimension 2 and total profit.

Table 12: Polynomial Regression Analysis: T_p versus I(S2).

The regression equation is

$$T_p = 2613578 + 136.2I(S2) - 0.1200I(S2) **2$$

$$S = 586.188 \quad R - Sq = 99.8\% \quad R - Sq(adj) = 99.8\%$$

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	1506413133	753206567	2192.00	0.000
Error	8	2748931	343616		
Total	10	1509162064			

Sequential Analysis of Variance

Source	DF	SS	F	P
Linear	1	821242505	10.74	0.010
Quadratic	1	685170628	1994.00	0.000

The regression analysis in Figure 9 and Table 12 shows that the investment in service level for service dimension 2 can significantly affect total profit.

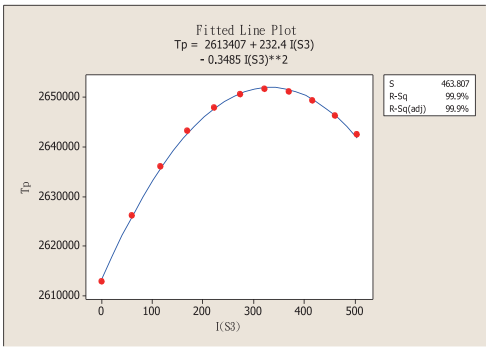

Figure 10: The relationship between the investment in service level for service dimension 3 and total profit.

The regression analysis in Figure 10 and Table 13 shows that the investment in service level for service dimension 3 can significantly affect total profit.

To sum up, the investment in service level for each service dimension and total investment can improve total profit. The investment in service level for each service dimension can be properly allocated to improve total profit. The scatterplot of the relationship among the investment in service for each service dimension and total investment in service with total profit is shown in Figure 11.

Table 13: Polynomial Regression Analysis: T_p versus I(S3).

The regression equation is

$$T_p = 2613407 + 232.4I(S3) - 0.3485I(S3) **2$$

$$S = 463.807 \quad R - Sq = 99.9\% \quad R - Sq(adj) = 99.9\%$$

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	1507441131	753720565	3503.78	0.000
Error	8	1720934	215117		
Total	10	1509162064			

Sequential Analysis of Variance

Source	DF	SS	F	P
Linear	1	831463336	11.04	0.009
Quadratic	1	675977795	3142.38	0.000

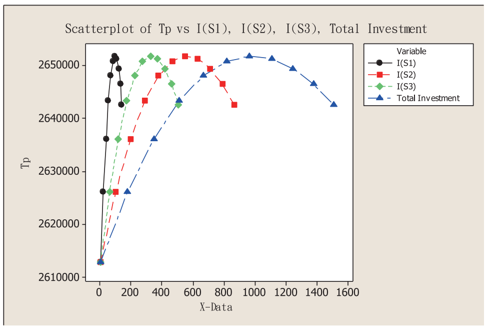

Figure 11: The scatterplot of the effect of the investment in service for each service dimension and total investment on total profit.

4. Conclusion

In this research, the cost and benefit are developed on the processes of service conformance and service improvement. As for the process of service conformance, the service level is affected by customer perception and customer expectation. The service demand can be affected by total service level which is composed of the service level for each service dimension and the corresponding weight for each service dimension. The weight can be evaluated by proper analytic hierarchy method. The service demand can be also affected by considering the price. The price and the service level can be integrated together to evaluate the effect on the service demand. In addition, customer perception should be improved so that service level for each service dimension can be enhanced. As for the process of service improvement, the investment in each service dimension is required to improve the service level, and thus results in optimal total profit. The models for these service processes can be easily applied in the company to predict the outcome of profit at each service process design. The proper allocation of investment can be considered for decision making of profit design.

In the future, the service innovation can be considered to affect service quality. The investment in service innovation is crucial to know the voice of the customers, and then the requirement of customers can be transferred to the service quality. Then, the service quality needs the service marketing to promote the advantage of service quality to the customers to initiate or strengthen the intention of purchase. As the customers intend to purchase the products or enjoy the service by spending some amount of money or time in the service, it creates the service values to the customers. The service across all the processes for the service industries and the customers then increases the sales and service economy. The investment in marketing can be included. By considering relevant service costs, the investment in innovation, and the investment in marketing, the total profit in service management can be enhanced. The decision makers can consider the proper investment strategy to allocate the source in the service processes to reach optimal profit or the minimum of total cost.

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