Multi-factor Analysis Model for Improving Profit Management Using Excel in Shellfish Farming Projects

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Abstract　By using a farm's data in Yantai City and the theory of Cost – Volume – Profit analysis and the financial management methods, this paper construct a multi-factor analysis model for improving profit management using Excel 2007 in Shellfish farming projects and describes the procedures to construct a multi-factor analysis model. The model can quickly calculate the profit, improve the level of profit management, find out the breakeven point and enhance the decision-making efficiency of businesses etc. It is also a thought of the application to offer suggestions for government decisions and economic decisions for corporations as a simple analysis tool. While effort has been exerted to construct a four-variable model, some equally important variables may not be discussed sufficiently due to limitation of the paper's space and the authors' knowledge. All variables can be listed in EXCEL 2007 and can be associated in a logical way to manage the profit of shellfish farming projects more efficiently and more practically.

Key words　Shellfish farming, Cost – Volume – Profit analysis, Multi-factor analysis, Profit management

1　Introduction

It has been recognized that Shellfish farming contributes greatly to people's livelihoods, food security, poverty alleviation, employment, trade, income generation, and corporation's profit; and that the potential of Shellfish farming's contribution has not yet been fully realized across all our country due to limitation of a scientific method for profit management (Gong & Wang, 2011)[2]. It also recognized that the potential of Shellfish farming's contribution to corporation's profit cannot be fully realized without a scientific method. Through innovations in technology and organization, intensification in operations, and diversification in products, species and culture systems, Shellfish farming continues growing in the new millennium towards a matured and global industry, accounting for half of the world seafood supply. While the sector is still mainly motivated by and promoted for its economic benefits, increasing attention has been paid to the profit management (Liu & Yang, 2005)[5]. Some effort has been tried to evaluate factory – circulating aquaculture by using the method of finance balance analysis. It was very useful to determine the management of aquaculture farm and control its cost. (Han, Liu & Bao, 2008)[3]. But the method to handle the data was by hand, which was ineffective for profit management. Despite the progress made, methods for profit management have only made baby steps and have many aspects to improve.

This paper briefly reviews the theory of Cost – Volume – Profit and assumes a balance of production and sale. In the following section, a multi-factor analysis model for improving profit management using Excel in Shellfish farming projects is constructed with the data obtained in Yantai City and discusses the results of the applications and the results of the model.

2　Materials and methods

2.1　Materials　The data was got from a farm in Yantai City, it contained 3 tables: the facilities equipment list (see Table 1); the structure cost list for shellfish farming (see Table 2); list for cost classification (see Table 3). The data of Table 1 is primary; the data of Table 2 and Table 3 are processed according to the theory of Finance and management (Jing, 2012)[4]. Besides, it cultured 92 thousands nets and harvested 91.6 thousands nets because of the loss caused by hurricane and other reasons, the production of one net is 15 kg, the total output was 1 374 thousand kilograms and the price was estimated at about 2.75 yuan/kg this year.

Table 1　The facilities equipment list　　　　　　　Unit: yuan

Items	Amount	Price	Total price	Memo
Piles	2 300	62	142 600	Including labor
Anchor ropes	29 900	8	239 200	cost of pile – driving
Floating ropes	23 000	8	184 000	32 yuan per unit
Nets& ropes	92 000	13	1 196 000	
Plastic floats	57 500	7	402 500	
1st lantern nets	300 000	0.4	120 000	
2nd lantern nets	3 000	8	24 000	
Rope buttons		34 500		
Ships	8	16 000	128 000	
Forklift	2	30 000	60 000	
Tractor	6	9 000	54 000	

2.2　Methods　This paper used the theory of Cost – Volume – Profit Analysis and Excel. The theory of Cost – Volume – Profit is the relationships among cost, volume and profits (Chen, 2012)[1]. The expression of the formula is as follows:

Profit = Marginal Contribution × Volume of Sales – Fixed cost

Marginal Contribution = Price – Variable Cost

Then, the paper uses Excel to construct a multi-factor analy-

sis model for improving profit management using Excel in Shellfish farming projects, and the procedures are as follows: (i) Create a new worksheet and enter all the relevant indicators. Open an EXCEL workbook, create a new worksheet, construct a multi-factor analysis model based on the data before, B4 = 870000/1374000 (see Fig. 1). (ii) Set the control buttons for variables to control them at a certain percentage. (iii) Set a scroll control button for D3. The method of operation was as follows: View→ Toolbars→ Forms→ Scrollbar → D3→Format D3 and then click to set the minimum, maximum, and step for D3 (see Fig. 2).

Table 2   The structure cost list for shellfish farming   Unit: yuan

Items	Initial investment	Depreciable life	Yearly depreciation	Cost of maintenance	Salvage value
Farm contracting fees	200 000				
Charge for Sea Area Utilization	48 000				
Fingerlings cost	320 000				
Labor Protection Necessities cost	13 000				
Insurance Premium	60 000				
Water and power expenses	90 000				
Oil Fare	60000				
Total Material Cost	2 342 800		435510		
Piles	142 600	5	28 520		0
Anchor ropes	239 200	5	47 840		0
Floating ropes	184 000	5	36 800		0
Nets& ropes	1 196 000	5	239 200		0
Plastic floats	402 500	5	40 250		0
1st lantern nets	120 000	5	24 000		0
2nd lantern nets	24 000	2	12 000		0
Rope buttons	34 500	5	6 900		0
Wehicles&Ships	242 000		34 900	41 000	
Ships	128 000	10	12 200	24 000	6 000
Forklift	60 000	10	5 700	7 000	3 000
Tractor	54 000	3	17 000	10 000	3 000
Total labour cost	1 200 000				
Long – term hired hand	800 000				
Short – term hired hand	400 000				
Total costs	3 495 800		470 410	41 000	12 000

Table 3   List for cost classification   Unit: yuan

Items	Fixed Cost	Variable cost
Charge for Sea Area Utilization	48 000	
Farm contracting fees	200 000	
Fingerlings cost		320 000
Depreciation cost	470 410	
Cost of maintenance	41 000	
labour cost	800 000	400 000
Insurance Premium	60 000	
Oil Fare		60 000
Water and power expenses		90 000
Labour Protection Necessities cost	13 000	
Total cost	1 632 410	870 000

Fig. 2   The method of operation

Fig. 1   Model for improving profit management

(iv) Establish a link between C3 and the scroll control bar (Zhang, 2011)[6]. At C3, enter " = D3/100 − 20% ", so that its value was at the range of ± 20%. Similarly, it could be set to D4, D5, D6.
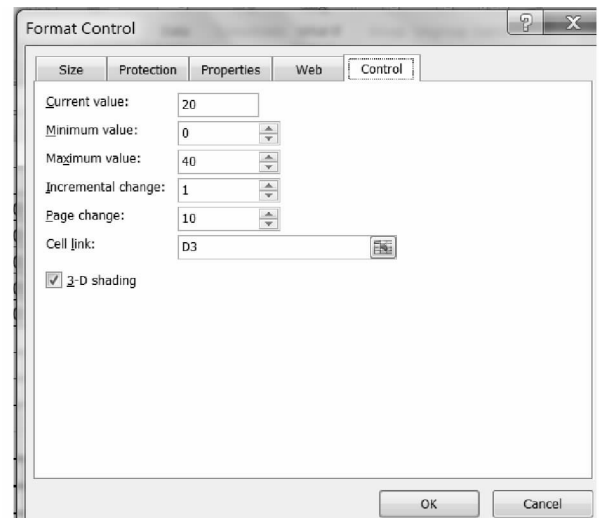

Fig. 3   The expression of the profit
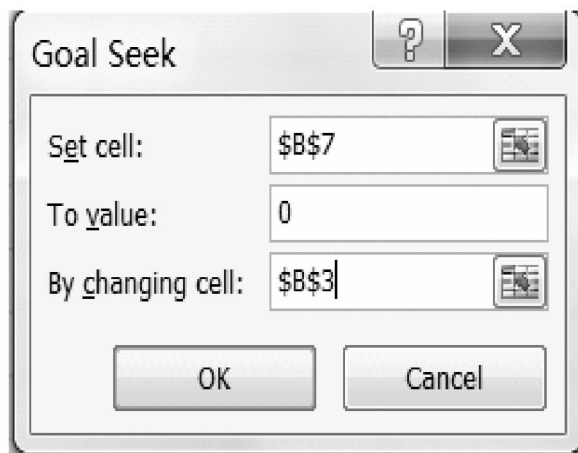
(v) Establish the profit formula. All the variables considered,

the expressions of the profit could be shown at D7 (see Fig. 3).

Profit of Shellfish farming project = (B3 × (1 + C3) − B4 × (1 + C4)) × B5 × (1 + C5) − B6 × (1 + C6)

At D7, enter " = (B3 × (1 + C3) − B4 × (1 + C4)) × B5 × (1 + C5) − B6 × (1 + C6) ".

3　Results

A multi-factor analysis model for improving profit management using Excel in Shellfish farming projects could quickly calculate the profit, improved the level of profit management, found out the breakeven point and enhanced the decision-making efficiency of businesses, etc. (i) Easily to find out the impact of a single variable on profits (see Fig. 4). (ii) Easily to find out the impact of multi − variables on profits (see Fig. 5). (iii) Easily to obtain the breakeven point, as shown in Fig. 6 (a), (b). The method of operation is as follows: Data→ What − if analysis→ Goal Seek. (iv) Enhance the decision-making efficiency of businesses greatly.

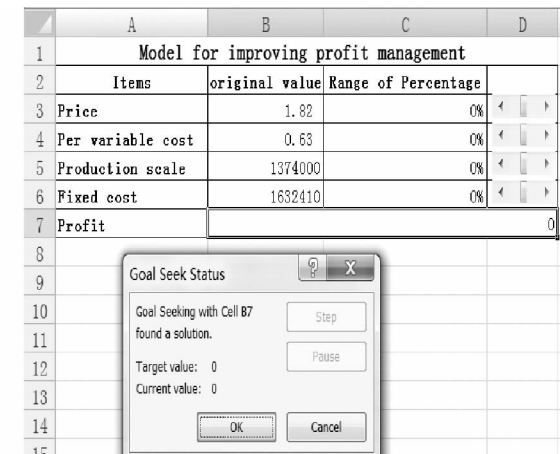|	A	B	C	D
1	Model for improving profit management			
2	Items	original value	Range of Percentage	
3	Price	2.75	−10%	
4	Per variable cost	0.63	0%	
5	Production scale	1374000	0%	
6	Fixed cost	1632410	0%	
7	Profit			898240

Note: Assuming the price decreases by 10%, the expected profit would be 898 240 yuan.

Fig. 4　The impact of a single variable on profits

	A	B	C	D
1	Model for improving profit management			
2	Items	original value	Range of Percentage	
3	Price	2.75	−10%	
4	Per variable cost	0.63	10%	
5	Production scale	1374000	0%	
6	Fixed cost	1632410	0%	
7	Profit			811240

Note: Assuming the price decreases by 10% and the fixed cost increases by 10%, the expected profit would be 811 240 yuan.

Fig. 5　The impact of multi − variables on profits

(a)

	A	B	C	D
1	Model for improving profit management			
2	Items	original value	Range of Percentage	
3	Price	1.82	0%	
4	Per variable cost	0.63	0%	
5	Production scale	1374000	0%	
6	Fixed cost	1632410	0%	
7	Profit			0

(b)

Note: In the conditions of fixed costs, variable costs and production remain unchanged, and the breakeven point is 1.82 yuan at the farming scale of 92 thousands nets.

Fig. 6　Obtaining the breakeven point

In sum, when one variable changes, the multi-factor analysis model for improving profit management using Excel in shellfish farming projects can quickly calculate the profit, improve the level of profit management, find out the breakeven point and enhance the decision-making efficiency of businesses. While effort has been exerted to construct a four − variable model, some equally important variables may not be discussed sufficiently due to limitation of the paper's space and the authors' knowledge. All variables can be listed in EXCEL and can be associated in a logical way to manage the profit of shellfish farming projects more efficiently and more practically.

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