

# Analysis of Activity-Based Costing in the After Press Services Industry

Suntichai Shevasuthisilp and Kosum Punsathitwong \*

**Abstract**—This research was conducted to apply activity-based costing (ABC) in an after press service company in Chiang Mai province, Thailand. The company produces all of its products by one-stop service (such as coating, stitching, binding, die cutting, and gluing). All products are made to order, and have different sizes and patterns. A strategy of low price is used to compete in the marketplace. After cost analysis, the study found that the company has high overhead (36.5% of total cost). The company's problem is its use of traditional cost accounting, which has low accuracy in assigning overhead costs. If management uses this information when pricing customer orders, losses may occur because real production costs may be higher than the selling price. Therefore, the application of ABC in cost analysis can help executives receive accurate cost information; establish a sound pricing strategy; and improve the manufacturing process by determining work activities which have excessively high production costs. According to this research, 6 out of 56 items had a production cost higher than the selling price, leading to losses of 123,923 baht per year. Methods used to solve this problem were: reducing production costs; establishing suitable prices; and creating a sales promotion with lower prices for customers whose orders include processes involving unused capacity. These actions will increase overall sales of the company, and allow more efficient use of its machinery.

**Index Terms**—activity-based costing, after press service, cost analysis

## I. INTRODUCTION

At the present time, competition in the after press service industry is very strong. One marketing strategy that is often used to attract customer attention is to reduce the price of an item to a level lower than that of the competitors. However, this could result in the company receiving lower or no profit. Moreover, if too high a price is established, the company's ability to compete in the marketplace will be reduced. Using incorrect pricing strategies could eventually force the company out of business, or into bankruptcy. The critical factor in effective cost administration is receiving accurate information about the true overall cost of a product. This can help management compete effectively against their rivals, and thus ensure the company's success and survival.

This study applies activity-based costing (ABC) to calculate the costs of one after press service company in Chiang Mai province, Thailand. After press service is a one-stop service that uses modern machinery operating at high capacity. Production processes include UV coating,

PVC coating, spot UV, water-based coating, folding, stitching, binding and gluing (Fig. 1). Products are of different sizes and patterns, so there are 990 different sequences that could be involved in manufacturing a customer's selection. Production processes and quantities vary each day, sometimes resulting in overwork. The necessity of short-term production planning further complicates cost analysis.

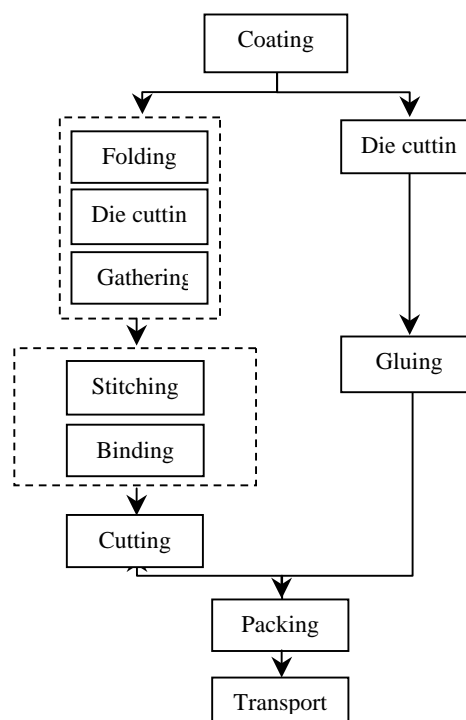


Fig. 1. Production process

The company's use of a low-price strategy, due to intense competition in the local marketplace, led to a steep reduction in profits (from 15% to 5%). Without accurate information about production costs, the company could experience further losses.

The object of this study is the use of ABC cost analysis in an after press service company. This method should help management receive correct information about costs, which can then be used to establish more accurate prices for their products, and also improve the manufacturing process.

## II. METHODOLOGY

Traditional cost accounting uses factors related to production quantity at the basis of cost analysis, such as production quantity or work hours. In fact, some production costs are not related to production quantity, but increase according to the number of batches or the variety of

\* Manuscript received December 23, 2008.

Suntichai Shevasuthisilp is with Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University, Chiang Mai 50200 Thailand (e-mail: shevasut@chiangmai.ac.th).

Kosum Punsathitwong is with Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University, Chiang Mai 50200 Thailand (e-mail: gig-ga@hotmail.com).

products (such as production preparation, or research and development). Hence such cost calculations could be inaccurate, and may lead to poor decision making.

Because of these defects in traditional cost accounting, ABC cost analysis was developed. ABC focuses primarily on activity-cause cost. In cost calculations, the work of each department is assigned into activities. Cost is then divided to each activity by using cost drivers related to the activities. Cost to product is then calculated according to the activity consumption of each product. Using the ABC system is appropriate for complicated businesses, having many different kinds of products or high overhead costs. Dividing costs into activities helps executives to better understand the actual cost of each activity and the cost per unit. The important distinctions between ABC and traditional costing can be divided into issues of cost behavior and issues of cost assignment [1]. If overhead costs are a significant portion of overall costs, ABC attempts to assign these to cost objects more accurately than in traditional cost systems [2], [3]. ABC can also be used to analyze medium- and long-term decisions, such as make-or-buy, pricing, and special-order decisions [4], [5].

There are four steps of cost assignment in the after press services industry using ABC.

### 1. Define activity

Activity analysis involves breaking down the work of an organization into individual activities. This approach first considers the nature of the work performed by each section. After learning these work characteristics and observing the overall operation, a determination is then made regarding which activity center each section should perform. As shown in Fig. 2, there are 12 units of activity centers: 1) office, 2) UV coating, 3) PVC coating, 4) spot UV, 5) water-based coating, 6) binding, 7) stitching, 8) folding, 9) die cutting, 10) gluing, 11) gathering and 12) transport. Most of these centers consist of two separate activities: machine set-up, and actual manufacturing work.

### 2. Define cost drivers

Cost drivers are the primary factors of cost changes for each activity. For example, the cost driver of set-up machine cost is the number of set-up machines. Each activity may have more than one cost driver.

Activity costs are defined in four levels:

**1) Unit level costs** are performed each time a unit is produced, and should be proportional to the number of units produced (e.g., direct raw material cost).

**2) Batch level costs** are performed each time a batch of goods is handled or processed, regardless of how many units are in the batch (e.g., set-up machine cost). The amount of resources consumed depends on the number of batches run rather than on the number of units in the batch.

**3) Product level costs** are related to the specific products, regardless of how many units are produced and sold or batches run (e.g., advertising cost).

**4) Organization level costs** are incurred regardless of which products are produced, how many batches are run, or how many units are made (e.g., cleaning cost; security

cost).

Cost drivers can be assigned in three ways:

**1) Direct charging** is used when the resource quantities that were directly consumed by each activity are known, such as direct raw material cost

**2) Estimation** is used when direct charging is not possible. An example would be interviewing workers in each department about their actual working time, in order to estimate labor cost.

**3) Arbitrary allocation** is used when a reasonable estimation cannot be made; for example, using the number of orders to estimate accounting cost.

There are two kinds of cost drivers: resource drivers used to divide cost from the cost accountancy to the activity centers; and activity drivers used to divide cost from the activity centers to the activity. The application of ABC in an after press services company is demonstrated in Tables I and II.

### 3. Calculate activity rates

The calculation of activity cost is performed to find the ratio of activity cost per unit of cost drivers; this can be done through the use of the two-stage approach.

In the first stage, resource costs are assigned to activity centers using the resource driver quantity that is related to each activity center. As shown in Fig. 2, the costs are assigned from resources into the activity centers. The resource drivers are shown in Table I.

In the second stage, activity cost pools are assigned to cost objectives using activity drivers (Table II). The driver indicates the amount of activity that is required to produce each item.

TABLE I  
Resource Drivers

Cost	Level	Assignment	Resource Drivers
• Raw material	Unit	Direct	Direct tracing
• Salary	Unit	Estimation	Work hours
• Rent	Organization	Estimation	Work area
• Electricity	Organization	Estimation	Work hours
• Depreciation	Organization	Estimation	Work hours
• Communication	Batch	Estimation	Number of orders
• Insurance	Organization	Direct	Direct tracing
• Taxes	Organization	Estimation	Revenues
• Fuel	Unit	Direct	Direct tracing
• Maintenance	Organization	Estimation	Direct tracing, Work hours
• Accounting	Organization	Arbitrary	Number of orders
• Other	Organization	Estimation	Work hours

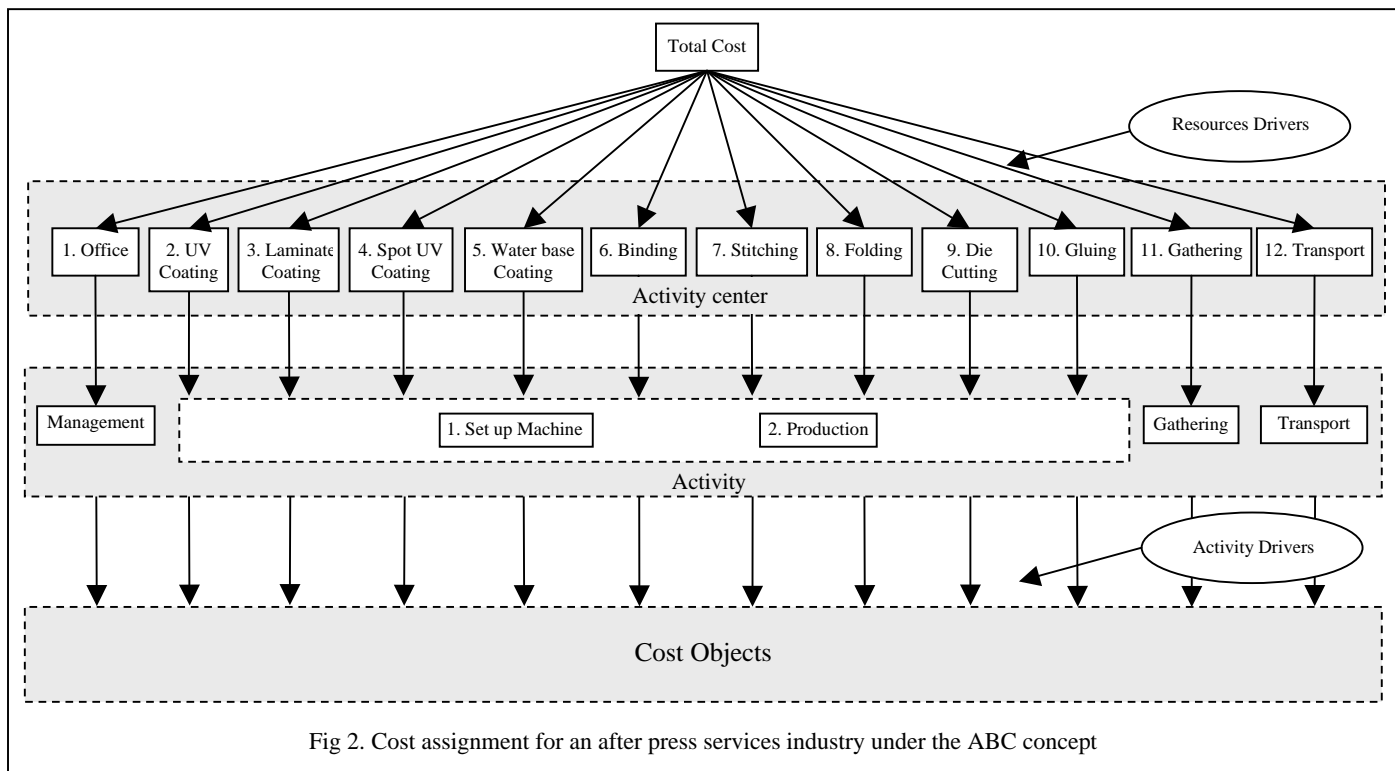


TABLE II  
 Activity Drivers

Activity Center	Activity	Level	Assignment	Activity Drivers
• Office	Management	Batch	Estimation	Number of orders
• Production	Set-up machine	Batch	Estimation	Number of set-ups
	Produce	Unit	Direct	Size/Form, Work hour
• Transport	Transport	Batch	Estimation	Number of orders

TABLE III  
 Cost Objective of PVC Coating

Cost	Activity Driver	Quantity of Activity (a)	Cost per Driver (b)	Total (Baht) (c=a*b)
• Management	Number of orders	1 order	14.43 Baht/order	14.43
• Set-up machine	Number of set-ups	1 set-up	42.50 Baht/set-up	42.50
• Produce	Number of pages	1,000 pages	1.12 Baht/page	1,120.00
• Transport	Number of orders	1 order	34.00 Baht/order	34.00
Total cost				1,210.93
Cost per unit = 1,210.93/1,000 = 1.21 Baht/unit				

#### 4. Assign costs to cost objects

After cost assignment by means of the two-stage approach, we know the cost in terms of cost per driver. Finally, we can calculate the total cost of production. The formula is to multiply the cost per driver by the quantity of activities required to produce a product. For example, Table III shows the costs of producing a PVC-coated product of 1,000 sheets with eight cut.

### III. RESULTS

Owing to the use of ABC analysis, we can now calculate the true cost of each product. Table IV shows a comparison of costs and prices of three key after press service products (classified by size), and the profit margin (% difference) of each.

This study found that out of a total of 56 items produced by the company, six (as seen in Table IV) had a cost higher than the selling price. The company lost about 123,923 baht in one year on these products.

TABLE IV  
Cost per unit calculated by ABC vs. price per unit

Product	Type		Price per unit (Baht)	Cost per unit (Baht)	% Differ- ence
Water-based Coating (1,000 pages)	Size	8 (150 in <sup>2</sup> )	0.30	0.20	50.00
		5 (216 in <sup>2</sup> )	0.33	0.26	26.92
	(cut)	4 (315 in <sup>2</sup> )	0.38	0.34	11.76
		2 (651 in <sup>2</sup> )	0.70	0.74	-5.41
PVC Coating (1,000 pages)	Size	8 (150 in <sup>2</sup> )	1.35	1.21	11.57
		5 (216 in <sup>2</sup> )	1.50	1.36	10.29
	(cut)	4 (315 in <sup>2</sup> )	1.70	1.67	1.80
		2 (651 in <sup>2</sup> )	3.40	3.52	-3.41
Stitching (10,000 books)	Number of Sheets	1	0.30	0.19	57.89
		2	0.35	0.31	12.90
		3	0.40	0.43	-6.98
		4	0.45	0.55	-18.18
		5	0.50	0.67	-25.37
		6	0.55	0.79	-30.38
Other					

% Difference based on cost per unit.

-: Costs per unit calculated by ABC are higher than prices per unit.

#### IV. DISCUSSION

After press service companies in this market area always use price strategy to compete with their rivals. Customers thus usually have a good chance to negotiate prices, as well as apply pressure for punctual delivery. Hence, it is possible that some products might be at risk of being sold at a loss. The utilization of ABC enables executives to know the true cost of an item's production, which allows greater precision than traditional costing. The accuracy of cost analysis helps producers set prices that are appropriate for local market conditions. Consequently, the business can compete effectively, as well as avoid unnecessary losses.

According to ABC analysis, the company's products which had a cost higher than the selling price were involved with three processing steps: PVC coating, stitching, and water-based coating.

The causes of the high cost per unit of stitching and water-based products are: machinery depreciation (44.10% and 51.21% of production cost, respectively); low sales targets (1.26% and 4.46% of total revenues, respectively); and unused capacity. The causes of the high cost per unit of PVC products are: a highly competitive price strategy; without knowing the true cost of the products.

The problem-solving method in the case of stitching and water-based products is to set up a sales promotion by reducing the price when a customer orders a large number of products. The costs per unit will be reduced because of the increased production quantity. The problem-solving method for PVC products is to reduce the raw material cost (43.38% of production cost). Toluene is used as a solvent in this process, but it evaporates quickly. Evaporation could

be reduced by controlling the temperature of the solution.

From the pricing analysis of all products, it was also found that larger products (size/form) were less profitable than smaller products. Again this is due to the company's use of traditional cost accounting, and a pricing strategy solely dependent on market conditions.

Suggested methods to improve the company's marketing strategy are: set up a price promotion, with volume discounts for certain items, in order to increase revenue; decrease production costs based on cost structure; and establish reasonable prices from production costs calculated using ABC.

#### V. CONCLUSION

The use of ABC can be applied in the after press services industry to reveal the true costs of production. This could help companies establish a sound marketing strategy, as well as improve the cost-effectiveness of production activities. Consequently, companies can achieve their goals of increased profits and more effective competition with other companies in the marketplace.

#### REFERENCES

- [1] V. Dickinson and J. C. Lere, "Problems evaluating sales representative performance? Try activity-based costing," *Industrial Marketing Management*, vol. 32, pp. 301-307, 2003.
- [2] C. Homburg, "Using relative profits as an alternative to activity-based costing," *Int. J. Prod. Econ.*, vol. 95, pp. 387-397, 2005.
- [3] R. Cooper and R. S. Kaplan, "Activity-based systems: measuring the costs of resource usage," *Accounting Horizons*, vol. 6, pp. 1-13, 1992.
- [4] C. Homburg, "Improving activity-based costing heuristics by higher-level cost drivers," *Eur. J. Oper. Res.*, vol. 157, pp. 332-343, 2004.
- [5] M. Gupta and K. Galloway, "Activity-based costing/management and its implications for operations management," *Technovation*, vol. 23, pp. 131-138, 2003.