# ANALYSIS OF ACTIVITY-BASED COSTING IN PRODUCTION PROCESSES: A CASE STUDY

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## Abstract

This project aims to study the production processes of Vietnamese pork sausage (Moo Yor), fermented pork (Naem), and Chinese sausage (Kun Chiang) in order to analyze production costs and identify unnecessary activities within the factory that could be reduced. The study began with data collection from Supattra Products Ltd., applying activity-based costing (ABC) to calculate actual production costs and eliminate non-essential expenses.

The findings indicate that the production costs-comprising raw materials, labor, and consumables-exceed the current selling prices. This is likely due to the company not accounting for other cost factors such as machinery depreciation and miscellaneous consumables. The unit costs per product are as follows: Moo Yor (90g, 140g, 470g) at 8.43, 13.33, and 44.10 baht respectively; Naem (300g) at 34.28 baht; and Kun Chiang (500g) at 58.10 baht. Moo Yor in all sizes shows the highest production cost. Currently, the selling prices of Moo Yor do not reflect the actual costs incurred. Through cost analysis of Supattra Products Ltd., the study identified cost-generating activities in the production of Moo Yor, Naem, and Kun Chiang. This led to recommendations for setting product prices that align with actual production costs.

**Keywords:** Activity-base costing, Production processes, Cost analysis

## 1. Introduction

Production management plays a crucial role in enhancing organizational competitiveness, as today's business environment is characterized by intense competition and constantly changing consumer demands. Effective production management not only reduces operating costs but also contributes significantly to profit maximization and the overall competitiveness of enterprises (Heizer *et al*., 2020). The core concept of production management emphasizes two essential aspects: (1) responding to customer demands, and (2) minimizing production costs to create added value and ensure long-term sustainability.

The case study of this research is Supatra Products Limited Partnership, which has been engaged in processed food manufacturing—such as Vietnamese pork sausage, fermented pork, and Chinese sausage—for over 20 years. The company has been certified under the Good Manufacturing Practice (GMP) standard and is recognized as one of the long-established processed food producers in Phitsanulok Province, distributing products across multiple provinces nationwide. However, large-scale production and product variety generate significant costs throughout production processes and related activities, posing challenges in cost control and profitability.

In modern cost management, one widely accepted and applied approach is Activity-Based Costing (ABC). This method provides more accurate cost allocation compared to traditional approaches (Kaplan & Cooper, 1998). ABC highlights which activities drive higher costs and identifies non-value-added activities, which can then be improved or eliminated to reduce waste (Gunasekaran & Sarhadi, 1998). Implementing this approach enhances efficiency, cost transparency, and supports strategic decision-making in the processed food industry.

Therefore, this research aims to investigate cost reduction in the operations of Supatra Products Limited Partnership through Activity-Based Costing. The objective is to identify actual cost drivers, minimize wasteful activities, and develop strategies that improve production efficiency, ultimately strengthening the competitive capacity of the processed food business in a highly competitive market.

**Figure 1** Products of the Case study enterprise

## 2. Research objectives

2.1 To study the production processes and various work activities within Supattra Products Limited Partnership in order to understand the operational steps related to production costs.

2.2 To analyze production costs using the Activity-Based Costing (ABC) method to identify sources of costs and activities that do not create added value.

2.3 To propose guidelines for setting product prices that align with the actual production costs, which will help improve cost management efficiency and enhance the enterprise's competitiveness.

## 3. Research methodology

This research is quantitative in nature, focusing on the production process of processed foods at Supattra Products Limited Partnership, with the objective of analyzing production costs based on the Activity-Based Costing (ABC) concept. ABC is widely recognized as an approach that provides more accurate identification of cost sources compared to traditional methods (Kaplan & Cooper, 1998; Gunasekaran & Sarhadi, 1998) and has been broadly applied in industrial practices to analyze unit costs (Nontha, 2017). The methodological details are as follows:

Population and sample

The population comprises production data of Vietnamese pork sausage (Moo Yor), fermented pork (Naem), and Chinese sausage (Kun Chiang) produced by Supattra Products Limited Partnership. The sample consists of average production data per production cycle in the year 2024, selected using purposive sampling, which is appropriate for industrial research that focuses on specific major production lines (Wadeecharoen *et al.*, 2017).

Study area and scope

The research was conducted at the processed food factory of Supattra Products Limited Partnership in Phitsanulok Province. The data collection period was from January to June 2024.

Research instruments

A production cost recording form (content validity IOC ≥ 0.7), developed in line with principles of research instrument construction. Production measurement tools such as weighing scales and work-time measuring devices. A questionnaire for the production manager's opinions (reliability Cronbach's $\alpha$ ≥ 0.8).

Data collection

Data were collected from production cost accounts, expense documents, production line observations, and interviews with operational staff, following practical industrial data collection approaches (Heizer *et al.*, 2020).

Data analysis

The Activity-Based Costing (ABC) method was applied, using cost drivers for each activity (Kaplan & Cooper, 1998). The activity cost is calculated as:

Activity Cost = Activity Cost Rate × Quantity of Activity Driver

The sum of all activity costs represents the manufacturing expenses of each product. The calculation of unit cost is given by the formula:

$$C_u = \frac{C_t}{Q} \quad (1)$$

Where:

$C_u$ = Unit cost of production

$C_t$ = Total production cost

$Q$ = Total units produced

Descriptive statistics (Mean and percentage) were used to compare actual production costs with the company's selling prices to assess economic appropriateness.

## 4. Research results

The research results employed Activity-Based Costing analysis, covering three types of products: Vietnamese pork sausage (Moo Yor), fermented pork (Naem), and Chinese sausage (Kun Chiang). The analysis was divided into three main parts:

(1) Analysis of machinery and equipment costs

(2) Analysis of depreciation costs of machinery per production cycle

(3) Analysis of packaging costs.

**Table 1** Analysis of Machinery and Equipment Costs

| Machinery | Usage in production line | | | Quantity used | Total cost (THB) | Usage life (Years) | Salvage values (THB) | Depreciation per year (THB) |
|---|---|---|---|---|---|---|---|---|
| | Moo Yor | Naem | Kun Chiang | | | | | |
| Pork slicing machine | ✓ | ✓ | ✓ | 1 | 69,000 | 7 | 5,500 | 9,071 |
| Pork griding machine | ✓ | ✓ | ✓ | 1 | 230,000 | 7 | 18,400 | 30,229 |
| Mixing cutter | ✓ | ✓ | ✓ | 1 | 6,705,000 | 10 | 636,000 | 606,900 |
| Stuffing machine | ✓ | | ✓ | 1 | 1,459,000 | 10 | 116,700 | 134,230 |
| Steaming oven | ✓ | | | 1 | 100,900 | 5 | 8,400 | 18,500 |
| Moo Yor ejector | ✓ | | | 1 | 9,312 | 5 | 700 | 1,722 |
| Cylinder (90g) | ✓ | | | 17,820 | 17,820 | 10 | 0 | 1,728 |
| Cylinder (140g) | ✓ | | | 10,530 | 21,060 | 10 | 0 | 2,106 |
| Cylinder (470g) | ✓ | | | 3,159 | 9,477 | 10 | 0 | 947.7 |
| Mixing machine | | ✓ | ✓ | 1 | 180,000 | 10 | 14,400 | 16,560 |
| Naem tying machine | | ✓ | | 1 | 32,000 | 5 | 2,500 | 5,900 |
| Boiling pot | | ✓ | | 1 | 38,900 | 7 | 3,200 | 5,100 |
| Drying oven | | | ✓ | 1 | 67,800 | 5 | 5,400 | 12,480 |
| **Total** | | | | | **8,939,729** | | **811,200** | **845,473.7** |

According to Table 1, which illustrates the analysis of machinery and equipment costs employed in the production process, it was revealed that the principal machines—namely the bowl cutter, meat grinder, and stuffer—constituted the highest proportion of costs. Notably, the depreciation expense of the bowl cutter amounted to 606,900 baht per annum, representing approximately 71.8% of the total depreciation costs. This finding underscores that large-scale machinery serves as the predominant cost driver within the production line.

**Table 2** Depreciation analysis of machinery per production cycle

| Machinery | No. of product types produced | Production cycles per year | Total annual cycles (time) | Depreciation per year (THB) | Depreciation per production (THB) |
|---|---|---|---|---|---|
| Pork slicing machine | 5 | 312 | 1,560 | 9,071.00 | 5.81 |
| Pork griding machine | 5 | 312 | 1,560 | 30,229.00 | 19.38 |
| Mixing cutter | 5 | 312 | 1,560 | 606,900.00 | 389.04 |
| Stuffing machine | 4 | 312 | 1,248 | 134,230.00 | 86.04 |
| Steaming oven | 3 | 312 | 936 | 18,500.00 | 19.76 |
| Moo Yor ejector | 3 | 312 | 936 | 1,722.00 | 1.84 |
| Cylinder (90g) | 1 | 312 | 312 | 1,728.00 | 5.54 |
| Cylinder (140g) | 1 | 312 | 312 | 2,106.00 | 6.75 |
| Cylinder (470g) | 1 | 312 | 312 | 947.70 | 3.04 |
| Mixing machine | 2 | 312 | 624 | 16,560.00 | 26.54 |
| Naem tying machine | 1 | 312 | 312 | 5,900.00 | 18.91 |
| Boiling pot | 1 | 312 | 312 | 5,100.00 | 16.35 |
| Drying oven | 1 | 312 | 312 | 12,480.00 | 40.00 |

According to Table 2, which presents the depreciation costs of machinery per production cycle, it was found that the bowl cutter incurred the highest depreciation expense at 389.04 baht per cycle. In contrast, supporting equipment, such as the filling tubes for Vietnamese pork sausage (Moo Yor) in sizes 90 g, 140 g, and 470 g, recorded depreciation expenses of 5.54, 6.75, and 3.04 baht per cycle, respectively. Although the unit costs of these items are relatively low, when aggregated with the large volume of production, they constitute a significant cumulative cost factor in the overall production process.

From Table 3, which analyzes packaging costs, it was found that the fermented pork (Naem) exhibited the highest packaging cost per unit (0.565 baht per bag) compared to Chinese sausage (Kun Chiang) at 0.313 baht per bag and Vietnamese

pork sausage (Moo Yor) at 0.170–0.229 baht per bag. This finding indicates that the type of packaging and product format directly influences the overall cost of the goods.

**ตารางที่ 3** Packaging costs for the Three products

| Item | Quantity | Total price (THB) | Unit price (THB) |
|---|---|---|---|
| **1. Moo Yor (90g/140g/470g)** | | | |
| Clear plastic bag for 90g Moo Yor | 470 bags | 80 | 0.170 |
| Clear plastic bag for 140g Moo Yor | 414 bags | 80 | 0.193 |
| Clear plastic bag for 470g Moo Yor | 350 bags | 80 | 0.229 |
| Large clear plastic bag for 90g Moo Yor | 160 bags | 50 | 0.313 |
| **2. Kun Chiang (500g)** | | | |
| Rubber bands for tying 500g bags | 2,080 pcs | 89 | 0.043 |
| Clear plastic bag for Kun Chiang | 160 bags | 50 | 0.313 |
| **3. Naem (300g)** | | | |
| Long clear plastic bag for packing Naem | 230 bags | 130 | 0.565 |
| Twist ties for sealign bags | 130 pcs | 55 | 0.423 |

**Table 4** Production cost per unit for the Three products

| Product type | Total production cost (THB) | Units produced per cycle | Selling price per unit (THB) |
|---|---|---|---|
| Moo Yor (90g) | 8,410.25 | 1,100 | 7.65 |
| Moo Yor (140g) | 8,205.35 | 650 | 12.69 |
| Moo Yor (470g) | 8,215.13 | 195 | 42.13 |
| Kun Chiang (500g) | 4,273.62 | 130 | 32.87 |
| Naem (300g) | 6,928.40 | 120 | 57.74 |

When consolidating all the data to analyze the production cost per cycle (Table 4), it was found that the unit costs of Vietnamese pork sausage (Moo Yor) in sizes 90 g, 140 g, and 470 g were 7.65, 12.69, and 42.13 baht, respectively. Meanwhile, the unit cost of Chinese sausage (Kun Chiang) was 32.87 baht, and that of fermented pork (Naem) was 57.74 baht.

When compared with the current selling prices (Table 5), the findings revealed that: Vietnamese pork sausage (Moo Yor): The selling prices were lower than the

actual production costs across all sizes, with costs exceeding selling prices by 1.6% (90 g), 8.7% (140 g), and 5.9% (470 g), resulting in losses. Chinese sausage (Kun Chiang): The selling price was 35 baht per unit, which was slightly higher than the actual cost of 34.28 baht, generating an approximate profit margin of 2.1%. Fermented pork (Naem): The selling price was 60 baht per unit, higher than the actual cost of 58.10 baht, yielding an approximate profit margin of 3.2%.

**Table 5** Comparison of research-based and current selling prices

| Product type | Selling price per unit (Research) (THB) | Current selling price (THB) |
|---|---|---|
| Moo Yor (90g) | 8.13 | 8 |
| Moo Yor (140g) | 13.15 | 12 |
| Moo Yor (470g) | 42.36 | 40 |
| Kun Chiang (500g) | 34.28 | 35 |
| Naem (300g) | 58.10 | 60 |

## 5. Conclusion and discussion

This study aimed to investigate the production processes, analyze costs, and identify appropriate pricing strategies for Vietnamese pork sausage (Moo Yor), Chinese sausage (Kun Chiang), and fermented pork (Naem) by applying the Activity-Based Costing (ABC) method. The ABC approach enables precise identification of cost sources and non–value-added activities (Kaplan & Cooper, 1998; Gunasekaran & Sarhadi, 1998).

The findings revealed that all three sizes of Vietnamese pork sausage (90 g, 140 g, and 470 g) had production costs exceeding the established selling prices, resulting in losses. By contrast, Chinese sausage and fermented pork still yielded modest profits. A key factor contributing to this outcome was that the enterprise's original costing practice did not include machinery depreciation and consumable materials, leading to underestimation of actual costs. This aligns with Nontha (2017), who reported that excluding the ABC method often results in cost distortions and inaccurate unit costs.

Activity-based analysis further revealed that the largest cost drivers were depreciation of major machinery and labor costs. Accordingly, the researcher proposes the following improvement strategies:

Efficient labor management: Planning the number and allocation of workers appropriately to reduce surplus labor costs.

Appropriate use of machinery and technology: Reducing reliance on manual labor and lowering long-term consumable costs, consistent with Heizer *et al.* (2020), who emphasized that investing in efficient machinery increases productivity while reducing costs.

Regular maintenance of machinery: Preventing production disruptions and minimizing hidden costs arising from equipment breakdowns. Raw material management: Sourcing from multiple suppliers to compare price and quality, while implementing inventory control measures to reduce losses due to material spoilage

5.1 Production Costs of Vietnamese Pork Sausage, Fermented Pork, and Chinese Sausage The cost analysis using the Activity-Based Costing (ABC) method revealed structural differences in production costs across the three products. When calculated as unit costs, the results were as follows: Vietnamese pork sausage (Moo Yor): 90 g: 8.13 baht per unit (Selling price: 8 baht) ⟶ loss of 1.6% 140 g: 13.15 baht per unit (Selling price: 12 baht) ⟶ loss of 8.7% 470 g: 42.36 baht per unit (Selling price: 40 baht) ⟶ loss of 5.9% Chinese sausage (Kun Chiang, 500 g): 34.28 baht per unit, compared with a selling price of 35 baht, generating a profit margin of approximately 2.1%. Fermented pork (Naem, 300 g): 58.10 baht per unit, compared with a selling price of 60 baht, generating a profit margin of approximately 3.2%. In terms of cost components, the major cost drivers were identified as follows: Machinery depreciation: Accounting for more than 70% of total costs, particularly from the bowl cutter and meat grinder. Labor costs: Significant in the production of Vietnamese pork sausage, where intensive manual labor led to higher costs relative to other products. Consumables and packaging costs: Particularly notable in fermented pork (Naem), which required specialized packaging, resulting in the highest packaging expenses among the products. In summary, all three sizes of Vietnamese

pork sausage exhibited production costs higher than their selling prices, resulting in losses, while Chinese sausage and fermented pork generated slight profits. This finding is consistent with international studies, which indicate that excluding hidden costs such as depreciation and consumables may result in underpricing relative to actual costs (Kaplan & Cooper, 1998; Heizer *et al*., 2020).

5.2 Cost Reduction Strategies in Production Activities Based on the ABC analysis, the main cost components in the production process were raw materials, labor, machinery depreciation, and consumables—serving as the primary cost drivers for each product. Therefore, the following cost reduction strategies are recommended: Raw materials: Implement supplier comparison to obtain competitive prices while maintaining quality standards. Improve raw material storage systems (e.g., temperature control, inventory management) to minimize spoilage, consistent with Lean Supply Chain principles. Labor: Optimize workforce planning to match production volume, avoiding excess labor usage. Provide training to enhance skills and efficiency, thereby reducing errors and processing time. Consider substituting machinery for repetitive, labor-intensive tasks to increase productivity and lower labor costs in the long run. Machinery and equipment: Conduct regular preventive maintenance to minimize risks of breakdowns and costly repairs. Invest in high-efficiency machinery or technology—even with high initial costs—as they reduce unit production costs over time (Heizer *et al*., 2020). Employ cost-benefit analysis (CBA) when deciding on new equipment investments.

Consumables and packaging: Establish standardized usage rates per production unit to control material consumption. Negotiate with suppliers to lower packaging costs or consider alternative materials that are cost-effective yet suitable for quality standards. Improve packaging design to reduce material usage while maintaining product quality and safety.

## 6. Suggestions

6.1 Research limitations

This study was conducted in a single enterprise, Supattra Products Limited Partnership, and therefore may not fully represent the cost structures of all processed

food manufacturers. Furthermore, the limited data collection period restricted the comprehensiveness of the findings, as some information relied on estimated values based on specific production cycles.

6.2 Recommendations for future research

To enhance generalizability and applicability, future research should expand to other types of processed food enterprises across multiple regions for comparative analysis of cost structures. In addition, the development of cost calculation models integrated with modern information systems and production technologies is recommended. Strategic management concepts, such as Lean Manufacturing and Green Productivity, should also be incorporated to provide sustainable cost-reduction strategies and improve long-term competitiveness in the industry.

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