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6 Activity-based Costing, the Methods of Strategically Oriented Cost Management

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6.1 Reasons for Introducing the Activity-Based Costing

The relative stable economic environment in the industrial era (1850 – 1975) was characterized by relatively long product life cycles, long-term relationships between customers and suppliers and a fairly stable product range. This situation enabled managers to manage costs according to the company's historical cost development, so they were mainly focused on achieving or improving product efficiency. The increasing competition over the last few decades (from the beginning of 1980s) has forced producers to manufacture new products, introduce new processes and technologies into the manufacturing process, obtain new customers and satisfy their constantly growing needs.

The necessity of reacting to changes in the economic environment as well developing new products and services influences costs and causes greater fluctuations in value ratios than what occurs in a relatively stable environment. The change of conditions also influences the functioning of some company's management tools. Traditional approaches such as cost management are no longer relevant in these new conditions because managers need accurate and sufficient information about the costs connected with their company's output and activities. Although these traditional methods are able to monitor the amount of resources spent and the location where these resources were

required, they do not provide information about the cause of costs as well as enable to managers to monitor all of the factors that influence the creation of their company's profit. This information is required by managers so they can make corresponding decisions that will lead to achieving the cost optimization. In other words, this should enable the most effective use of inputs and eliminate any waste of costs. Only in this way can the future development and long-term prosperity of a company be secured.

As a reaction to this situation, new management accounting tools have been developed. These tools are based on individual activities, operations and processes. These methods are Activity Based Costing (ABC), Activity Based Budgeting (ABB) and Activity Based Accounting (ABA).

The basic pre-condition which led to the creation of modern calculation methods was **the attribution of costs to their real causes**. Therefore, the real **causal relationships between output and internal activities**, which are necessary for their implementation, **and costs**, which have to be spent, should be found. The requirements are relevant not only for manufacturing industries but also for services, transport, the banking industry, etc. The modern system of cost management should fulfil the following tasks:

- reflect not only responsibility ties to costs but also the actual course of processes;
- express costs precisely and in sufficient detail;
- provide information necessary for decision making throughout the entire product life cycle;
- distinguish between costs of various objects - products, services, processes, activities;
- monitor cost not only from the perspective of inputs, but also from the perspective of outputs (the costs should be relative to the output manufactured);
- measure efficiency and limit (eliminate) waste;
- identify processes and expenditures that do not create value and support processes that create value added;
- rather than only monitoring costs, the reporting should be focused on planning and managing costs;
- use modern techniques.

It is obvious that these requirements cannot be reached using the traditional calculation systems that are based on the volume of additional charges or on the separate classification of fixed and variable costs. Therefore, qualitatively different ways of cost management should be used.

6.2 Calculating based on partial activities

The most often mentioned weakness of traditional calculation methods (mostly full cost calculation) is that they partially deform the amount of total cost per unit, they do not show the causes of incurrence of costs and they do not allow for the introduction of effective measures to reduce a company's costs. In reality, many components of costs are related to specific activities that are not connected with output. This should also be reflected in calculation techniques.

6.2.1 The essence of Activity Based Costing (ABC)

The requirements mentioned above (see item 1) have become the basis for **Activity Based Costing** (ABC). This method monitors the flow of costs in running processes, operations and activities that are necessary for the output creation. This information is subsequently used for calculating the total costs of this output.

An activity is a basic element of a business process that can be defined in terms of costs spent in connection with the implementation of a specific activity, or in terms of a measurable output that results from this activity. The activities are divided into:

- **primary activities** – they add value to a product or a service; their costs (inputs) and also the purpose of their spending (output) can be expressed;
- **secondary activities (supporting)** – do not add value to a product or a service; they only serve as support for primary activities; they are not attributed to a cost object because there is no causal relationship between these activities and the cost object.

An operation means a systematic link of individual activities that create a functional or purpose-built part of a company's processes.

A process can be characterized as a systematic link of operations.

The pre-condition for process management is having a definition of individual activities. Within process management, economic resources spent (costs of a company) are transformed through activities, operations and processes into the company's output. (its products and services)

The processes, operations and activities running in a company can be characterized by the following:

- **quality** – the proportion of inputs of individual processes and activities that has the required quality,
- **time** – how much time elapses from the acceptance of an order to the delivery of the final product to a customer,
- **costs** – the amount of costs required by individual processes to produce the final output.

Another important benefit of this new management concept is the mutual interconnection of between value and the factual side of management. The critical factors of management are not only costs and price, but also time and quality. The actual implementation of an activity (manner, speed and quality) influences both costs and the value of a product or service so that it is embodied in its price and subsequently in the company's profit.

6.2.2 The content and technique of Activity Based Costing

Activity Based Costing is focused on monitoring costs in relation to individual activities. The information about costs and the extent of individual activities are further

used by attributing costs to individual activities. The main reason for the creation and development of this method is the additional overhead costs that are necessary for securing support, service, information, planning and control activities in a company. It is difficult to assess their functional relation to concrete types of final products when using traditional calculation techniques. This method is not a fundamental breakthrough in costing because it uses the traditional technique of attributing overhead costs to a unit of production and it does not address other weaknesses of the full cost calculation. Nevertheless, it is an important shift in cost management because it **significantly improves the cost calculation** of individual products. (Walther and Skousen, 2009, p. 115)

Within ABC, costs are not attributed to all business activities, only to some of them. Those costs that are a part of ABC can generally be divided into the three following groups:

- **direct costs** – as is true in traditional costing these costs are attributable directly to the unit of production;
- **costs attributable with the help of activities** – their share of a company's costs is increasing; these are traditional overhead costs;
- **non-attributable costs** – their share of a company's costs is very small (about 5%); they are considered clearly fixed costs; they have almost no functional relationship to operations and activities performed; they are proportionally attributed to a unit of production according to the total attributable costs.

The process of costs allocation according to Activity Based Costing consists of the following steps: (Horngren, Harrison and Oliver, 2012, p. 883)

- defining centres and activities where indirect costs are incurred;
- attributing the total amount of indirect costs to the activity centre (Cost Pool) and determining the factor that influences the consumption of indirect (overhead) costs. This factor, which is called the **Cost Driver** (CD), expresses what caused these costs to be incurred;
- the definition of a cost driver;
- determining the rate (rate = the total indirect costs of an activity/number of cost drivers);
- attributing indirect costs of an activity to the output.

The activities monitored in centres should be determined by managers. Cost drivers are usually determined by managers in cooperation with production and technical staff and the accounting department.

6.2.3 The importance, strengths and weaknesses of Activity Based Costing

The primary objective of ABC – **refining the calculation of production costs** is important not only for determining the sale price, but also for making decisions regarding changes in product range or development of new or innovated products or

services. This method also allows of the control of partial processes in which the costs are incurred.

The main strengths of ABC are:

- better identification of what causes overhead costs to be incurred,
- improving the management and control of overhead costs,
- by monitoring cost drivers in time, it is found out how and when the costs are changing,
- improves the clarity and accuracy of information about overhead costs,
- improves the efficiency and effectiveness of activities.

The weaknesses of ABC can be summarized in the following way:

- it requires a detailed (laboriously detectable) analysis of activities and cost drivers;
- there is a danger that cost drivers and their relationship to a product are based only on past development regardless of the future;
- it is connected with high costs of its implementation and operation; it is usually necessary to create **a database of resources** (costs), **activities** and **products**. All these databases have to be interconnected on the basis of logical relationships, which is a complex process.

The ABC is used mainly for the allocation of overhead costs, which do not have a verifiable relationship to change in output, i.e. by fixed costs. They are mostly used in the manufacturing industry with heterogeneous production where lots of support and service activities are required (installation of machinery, repairs, maintenance, quality control and marketing). This method is also useable in services, banking, the insurance industry and transport.

6.2.4 A comparison between the traditional calculation process and ABC

The ABC enables users to divide overhead costs and attribute them to individual activities that cause these concrete overhead costs. ABC, which attributes overhead costs in separated groups to individual activities, is more accurate than traditional full cost calculation. Like the traditional costing, it is a static method when costs are expressed as an average to a product unit. This amount is correct only when there is no change in output or product range. The basic difference between both systems is shown in figure 1.

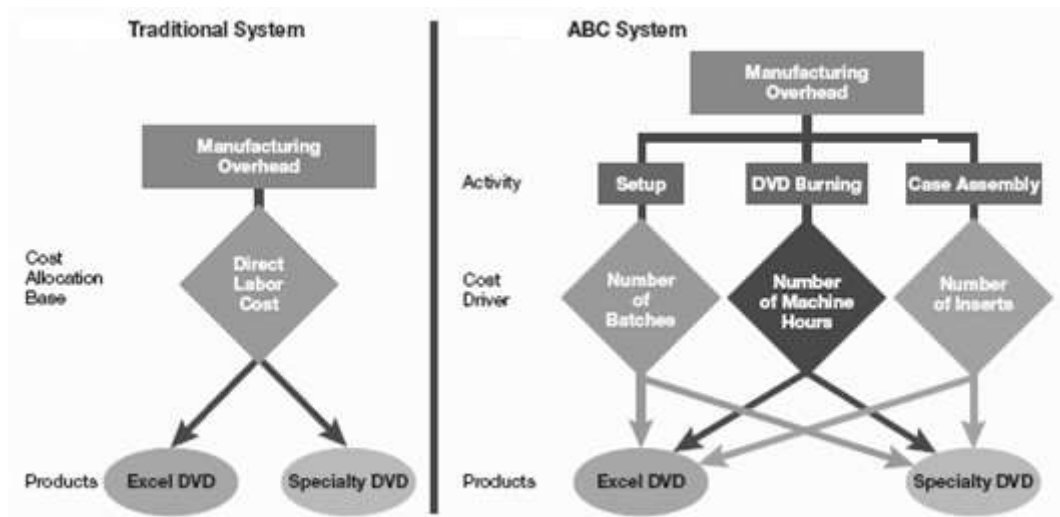


Figure 6.1 The comparison between traditional costing and ABC

Source: Modified by HORNGREN, C. T., W. T. HARRISON and M. OLIVER, Accounting, p. 885.

6.3. Strategically oriented cost management

The tools and methods of cost management used primarily for short-term management, which also include ABC, are used for the **cost management** of a company in **the production stage**. However, the business practice shows that the creation of output causes costs in all stages of the product life cycle. Therefore, within strategic cost management, it is necessary to classify costs from the long-term point of view. In many industries, the importance of the non-productive stages of the product life cycle is growing. This trend especially exists in industries focused on the production of technologically demanding products that require extensive R&D, production planning, etc. (for example, the automotive industry) In addition, for current manufacturing conditions, it is typical that during the actual manufacturing process it is usually not possible to change its technological parameters and thus influence production costs. This implies that most of the costs (up to about 90% of a company's total costs) are determined in pre-production stages and when the manufacturing process starts, the managers have only limited options to manage costs and decrease them. Within the production stage only the operative control of efficiency is performed.

6.3.1 The development of costs during the product life cycle

It is generally true that costs are spent relatively equally through the individual stages of the product life cycle. First, the costs connected with pre-production stages are spent. After that, costs are continuously spent on activities connected with the actual manufacturing process (production and sales costs are spent to achieve revenue and profit). In the post-production stage, the rest of the costs connected with a certain product are spent (the liquidation of old inventories, old technology and handling warranty repairs). All these costs are an actual spending of the company's resources and they are called **actual costs incurred**.

Even if the costs are spent equally, it is possible to change them slightly during the production stage. Contracts with suppliers have already been concluded and, therefore,

the production process is both organizationally and technologically fully ready. The costs connected with these activities have not yet been spent, but the preparatory decisions have already been made. Therefore, these costs are called **decided costs**. These costs are mostly incurred in pre-production stages when the decisions concerning future costs are made.

The essence of strategic cost management is the management of costs that are incurred throughout the **entire product life cycle**. If a company wants to optimize its costs as well as influence them, only managing efficiency during the actual production process is not sufficient. (the decision about most of the costs have already been made) It is necessary to focus on costs spent during pre-production stages and also any costs incurred during other stages should be taken into account. This can occur through the use of the two following methods of strategic cost management → **target costing and life cycle costing**.

6.3.2 Target Costing

This method is currently one of the most used methods of strategic cost management. It was developed in the 1960s in Japan and, shortly after that, it was introduced in many companies in Japan, the USA and Western Europe. Before that, the principle of target costing was used by Bata in the 1920s and 1930s in former Czechoslovakia. Kato (1995) describes target costing as an activity that aims to check all options of reducing R&D costs during the creation of a prototype. This activity should result in a product design that will satisfy all requirements and expectations of the customers and whose costs and price will provide the required level of profit to the company. Target costing is used in the production of complicated products with vast R&D and in very competitive industries where producers are forced to find all options of cost reduction. The purpose of target costing is:

- setting expected product costs according to expected sale price and required profit levels,
- finding ways of reducing product costs even before the start of the manufacturing process,
- creating a product design that will satisfy all customer requirements and whose costs and price provide the required level of profit to the company.

The process of target costing begins with identifying a **target price** at which a product should be sold over the long run. This price is based on a company's goals and price policy and it should reflect the customer perceived value of a product.

In addition to the target price, the **target profit** should also be determined. It is usually based on the required return on capital employed and subsequently on the return on revenue. A lower limit of target profit should be set as the amount of money obtained from the best alternative use of capital employed, i.e. opportunity costs.

TARGET PRICE – TARGET PROFIT = TARGET COSTS (costing based on the market principle)

Target costs are the maximal acceptable costs that can be spent on a certain product. They are called **costs determined by the market** (they reflect not only a company's internal conditions, but also the market relationships outside a company and the required return on capital employed).

Target costs are subsequently compared with pre-calculated product costs. These costs express the expected costs of a new product that are calculated according to the product's properties and the manufacturing process method. If the pre-calculated product costs are higher than target costs, options for further cost reduction should be found until the target costs are reached. Target costing prefers finding cost reduction especially in technological processes and materials used in the manufacturing process so that the customer perceived value does not decrease.

The strengths and weaknesses of target costing

Target costing enables influence on product costs in the pre-production stages of the product life cycle and it is also used as a tool for reducing a company's cost. However, it requires very intensive cooperation between the individual departments within a company (marketing, R&D, production planning and finance) and also with suppliers => it leads to an improvement of the cooperation between individual departments.

But, on the other hand, target costing uses future, estimated and forecasted output. It also does not provide reliable forecasts of the sales price and costs.

6.3.3 Life Cycle Costing

This costing is another tool of strategic cost management. Its purpose is to estimate product costs that are incurred during the product life cycle. It is a wider perspective of product costs – in addition to the costs connected with its production and sale, these costs also include costs during the pre-production stage (costs spent on R&D and production planning), costs connected with the end of manufacturing and other costs that are usually not included during normal operative and planned costing. This costing reflects changes in the sales price or in production costs throughout the entire product life cycle.

This costing was developed because the proportion and importance of the costs connected with developing new products as well as of the costs connected with the end of the manufacturing process is growing. Therefore, it was necessary to incorporate these costs into calculations of relevant profitability ratios. Life cycle costing reflects the following factors:

- the length of the product life cycle – this is a time it takes for a product to be produced and sold; this period is influenced by the marketing success of the product;
- the amount of output during the product life cycle – it significantly influences revenue, total variable costs, total and average fixed costs as well as all other ratios derived from them (the pay-back period, profitability and the break even point);

- the anticipated changes to the sales price – it is influenced by various factors, but only some of them can be influenced by a company;
- the total expected production costs – these costs are mostly spent on R&D, production planning, the manufacturing process and the sale of products; this part of target costing is closely interconnected with planning and budgeting.

Life cycle costing can be calculated before the start of the manufacturing process, during or at the end of the product life cycle. For strategic cost management, which is mostly focused on pre-production stages, this costing should be calculated before the start of the manufacturing process together with target costing. The future development of costs can be estimated in the pre-production stage and subsequently a decision about the introduction of the product into the company's product range can be made. With the help of life cycle costing, the total profitability of a certain product can be monitored. Although some potential negative effects detected during or at the end of the product life cycle cannot be avoided (most of these costs are *sunk costs*), this analysis can bring about important information for the management in making future decisions.

The use of Life Cycle Costing

Based on the above-mentioned information, several ratios can be calculated. For example, the **Break Even Point analysis** is applied to data provided by life cycle costing. The Break Even Point expresses how many products a company must produce during the product life cycle to cover all fixed costs incurred including any costs spent on R&D or marketing.

$$\text{BEP} = \frac{\text{TFC}}{P - \text{AVC}}$$

Where: BEP.....Break Even Point,
 TFC.....Total fixed costs (R&D, product planning, marketing etc.),
 P.....sale price,
 AVC.....average variable costs (variable costs per unit).

The above-mentioned expression of the Break Even Point differs from the Break Even Point used when making short-term decisions to which the output is related as well as by the expression of individual values. With short-term decisions, the return on fixed costs by the existing production capacity is monitored. With long-term decisions, the return on total costs, which behave like fixed costs (in the pre-production, production and post-production stages), is monitored. These costs are not caused by a concrete product, but by time or the total output.

Life cycle costing has a significant impact, especially in companies with extensive R&D and production planning. It can be also used in industries that do not have any classical R&D. If life cycle costing is used in companies with a broad product range with a shorter product life cycle, the costs spent on R&D and product planning are lower. In such cases, this costing should be related to the whole product group or product range.

In conclusion, it can be said that life cycle costing assesses product costs for the entire product life cycle, including any costs spent on R&D, production planning, marketing

and the end of the manufacturing process. In addition to reflecting the total production costs, it also reflects any changes in sales during the product life cycle when evaluating the efficiency of products. By using life cycle costing, the length of the product life cycle, estimated volume of output, expected sales price and costs spent throughout the entire product life cycle should be taken into account. The information obtained from life cycle costing can be further evaluated with the help of the methods used during the financial evaluation of investment projects. It is mostly focused on managing costs spent throughout the entire product life cycle by respecting changes in prices and costs. Average fixed costs are not dependent on the output within a certain time period, but they are dependent on the output throughout the whole product life cycle. Moreover, this costing enables controlling the costs spent on R&D and the costs connected with ending the manufacturing process. These costs are usually not a part of the costing methods used in operation planning.

Summary

The development of Activity Based Costing is connected with the significant changes in the business environment that occurred during the 1980s. Even if it is not a completely new method, it provides some new information for managing activities, operations and processes. The monitoring of costs caused by activities enables the assessment of cost requirements and helps to eliminate activities that have no or minimal positive effect. ABC reveals the real reasons why costs are incurred and provides, compared to a full cost calculation, a better expression of overhead costs spent. Changes in the business environment also contributed to the development of target costing. Companies can influence their results to a greater extent with the help of cost management in the pre-production stages (R&D and production planning). The aim of target costing is to achieve a level of costs and determine a sales price for a future product that provides the target level of profit for a company. Target costing assesses the product's costs throughout the whole product life cycle, including any costs spent on R&D and the costs connected with ending the manufacturing process.



Exercises

1) A company produces three types of products A, B, C. All products undergo a common output control and by some products special tests are made. Overhead costs of for the common control are 765,000 CZK and costs of special tests are 668 CZK. The data describing the manufacturing and control are shown in table 1.

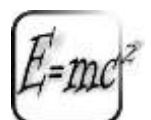


Table 6.1 Input data

Product	A	B	C
Output (in pieces)	2,000	3,000	4,000
Duration of common output control of 1 pc in minutes (CD 1)	25	25	25
Proportion of products which undergo special tests	40 %	35 %	20 %
Duration of special tests of 1 pc in minutes (CD 2)	40	30	25

Source: Self-created.

Tasks:

- 1) Attribute the costs spent on product control using the Activity Based Costing.
- 2) Attribute the costs spent on product control using the traditional calculation of overhead rates (without distinguishing various types of costs).

Solution:

1) **Activity 1 (common control)** → total duration of common product control = $(2,000 \times 25) + (3,000 \times 25) + (4,000 \times 25) = 225,000$ minutes

$$\text{Rate 1} = \frac{765,000}{225,000} = 3.40 \text{ CZK/minute}$$

The costs spent on the common product control of 1 piece A, B, C = $3.4 \times 25 = \underline{85 \text{ CZK}}$

Activity 2 (special tests) → total duration of special tests = $(2,000 \times 0.4 \times 40) + (3,000 \times 0.35 \times 30) + (4,000 \times 0.2 \times 25) = 83,500$ minutes

$$\text{Rate 2} = \frac{668,000}{83,500} = 8 \text{ CZK/minute}$$

The costs spent on special tests

1 pc A	=	8×40	=	320 CZK
1 pc B	=	8×30	=	240 CZK
1 pc C	=	8×25	=	200 CZK

Check: Total costs spent on the common product control = $9,000 \times 85 = 765,000$ CZK
Total costs spent on special tests

A	=	320×800	=	256,000 CZK
B	=	$240 \times 1,050$	=	252,000 CZK
C	=	200×800	=	160,000 CZK
				<u>Total = 668,000 CZK</u>

Total costs of the whole control process per

1 pc A	=	$85 + 320$	=	405 CZK
1 pc B	=	$85 + 240$	=	325 CZK
1 pc C	=	$85 + 200$	=	285 CZK

2)

Total costs of the whole control process = $765,000 + 668,000 = 1,433,000$ CZK

These costs will be attributed according to the total duration of both types of control:
 $(25 + 40) \times 2,000 + (25 + 30) \times 3,000 + (25 + 25) \times 4,000 = 495,000$ minutes

$$\text{Rate} = \frac{1,433,000}{495,000} \approx 3 \text{ CZK/minute}$$

The costs spent on the whole control process

1 pc A	=	3×65	=	195 CZK
1 pc B	=	3×55	=	165 CZK
1 pc C	=	3×50	=	150 CZK

2) A company produces microscopes. From the beginning of the New Year, this company plans to produce a new type of a microscope. The price of the current

microscope is 1,200,000 CZK and the price of the new one should be 1,350,000 CZK. Calculate the target costs of the new microscope.

Solution:

The target costs are calculated as the difference between the target price and the target profit. The amount of the target profit is based on the return on equity. The producer requires the return on sales in the amount of 15 % and the required profit is 202,500 CZK. The calculation of target costs is shown in table 2.

Table 6.2 The calculation of target costs

Item	CZK per 1 piece
Target price	1,350,000
Required return on sales	15 %
Target profit ($0,15 \times 1,350,000$)	202,500
Target costs (1,350,000 – 202,500)	1,147,500

Source: Own computation.

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