

THE USE OF ACTIVITY-BASED COSTING IN PRICING DECISIONS - THE EXAMPLE OF PRUNE PRODUCTION

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Abstract

This paper explores the scopes of use of costing information for setting product prices in a competitive market. Setting the optimum product price that reconciles shareholders' and customers' long term goals has never been more difficult. Previous researches have proved the paramount importance of costs for pricing decisions. This paper investigates the influence of ABC costing information on pricing decisions and argues on their dominance over traditional costing systems. Using the hypothetical example of a prune producing company, the analysis reveals significant differences between traditional and ABC cost prices of products, highlighting the benefits of ABC approach. Tracing costs to various production-related activities within a company, the ABC model gives a detailed insight into the types and amounts of costs of attaining specific product characteristics and satisfying different customer demands. This way, the ABC provides the management with considerable discretionary power for pricing decisions, setting a sound basis for product and customer profitability management as well as for the creation of long-term value for shareholders.

Key words: pricing; cost allocation; activity-based costing; prune production

JEL Code: M11, M41, Q13

Introduction

Setting the prices of products and services is well-known to be one of the most important and most difficult decisions for the management. Selling prices directly affect production and sales volumes, amounts of expenses, revenues and income, forcing the management to pay close attention to decisions of this kind (Malinic et al., 2013). In recent years, international agri-food markets were affected by significant price volatility (Matoskova, 2011). Continuous financial management decisions are necessary for the survival on such markets (Muegra et al., 2016). Regardless of the chosen strategy for the given market, prices must be set as a result of careful planning and analysis, making a clear statement of the management's strategy. The management must never have doubts about the chosen prices in the given moment.

Consequently, the knowledge on the effective management techniques may become an important competitive advantage for the company (Stikova, 2012). A number of large, gradual changes affecting agriculture have led to an increased importance of the financial and economic management, requesting a scientifically based understanding of business decisions (Wauters et al., 2014).

Although it is well-known that prices are set as a result of supply and demand on a given market, it is still evident that successful pricing decisions incorporate a whole specter of different information, including existing and expected competition, customer demands, relations with suppliers and distributors, specific economic policies, control measures, characteristics and demands of the regulatory framework etc. as well as the unavoidable information on costs throughout the entire value chain (Malinic et al., 2013). Pricing decisions are virtually impossible without costing information. The management focused at creating long-term value for shareholders must never lose sight of costs, not even when other factors predominately influence price levels at a given moment. Although long-term value creation can bear with short-term loses, it can only do so in a limited time period. Thus, pricing the products below the cost threshold must always be supported by justifiable strategy and a clear plan for future actions.

The idea of this paper is to investigate the significance of costing information for pricing decisions and to examine the possibilities of the ABC costing, as a modern and more precise costing approach compared to traditional costing systems. The remainder of the paper is organized as follows. The succeeding section gives a short review of relevant research and highlights the specific issues in the use of costing information for price-setting decisions. The section that follows illustrates the application of ABC model in a prune-producing company, and investigates the informational contribution of ABC to pricing decisions. The final section concludes and stresses the topics for possible future research.

1 The impact of market feedback and costs on pricing decisions

1.1 Review of prior research

The influence of market feedback and costs on price-setting decisions has been a point of contention among many economists, accountants and managers. The results of numerous researches on the subject matter vary significantly - from the conclusions that costs are a key factor influencing selling prices, to the complete negligence of their importance.

As noted by Cardinales et al. (2004) the majority of such researches completely neglected the competitive environment, studying the decision makers' behavior in individual settings. These researches argued that decision makers significantly relied on costing information in their pricing decisions. Research of Wilner and Bimberg (1986) and Moon (1990) (according to Cardinales et al., 2004) suggested that certain levels of market feedback might mitigate management's reliance on the costing information. Hilton et al. (1989) (according to Cardinales et al., 2004) proved that the influence of market feedback on sale prices is insignificant.

Other researchers however argue that such findings could not be valid in a competitive market setting. Waller et al. (1999) and Briers et al. (1997) prove that the impact of costing information on selling prices quickly disappears on the competitive market, where the decision makers rely more on selling prices of successful competitors than on their own expenses. Actually, latter researches highlight the significance of market feedback for pricing decisions, revealing it as an alternative source of knowledge on costs and best practices, whose existence drastically diminishes the need for accounting i.e. costing information.

Cardinales et al. (2004) examine whether the accuracy of the available costing information acts as a significant factor in price setting on the competitive market. Recognizing the fact that market feedback is not always informative i.e. that in certain cases market information will not credibly reflect customer demands and cost factors, they prove that a more accurate costing information provided by the ABC model enables the decision-makers to better understand market information, and to timely recognize the wrong market signals and avoid their impact on pricing decisions, thus protecting their performance.

Dearman and Shields (2001) base their research on the fact that most managers actually use only traditional costing information for decision-making purposes, in spite of the evidence that ABC provides significantly more precise information in a heterogeneous product range setting. They argue that even the mere knowledge and experience with the ABC can help the management with price-setting decisions, even when they only have traditional costing information at their disposal.

1.2 The use of costing information for price-setting decisions

As suggested by elaborated researches, costing information is a constituent part of management's arsenal in price decision-making. Without the adequate measurement of costs it is practically impossible to determine the optimum level of selling prices i.e. to set a price customers are willing to pay, at the same time not jeopardizing the creation of long-term value

for shareholders. Even when the management is acting as a price-taker on the market, the influence of costs is inevitable. The only reasonable manner to plan the future actions (regarding product placement, possible improvements or product withdrawal from the market) rests on the current and expected product profitability (partially determined by costs).

However, *different costs for different purposes* concept raises the question of cost basis to be used for pricing decisions. Proper choice of cost basis is equally important whether the selling prices are determined using the cost-based or market-based approach. Furthermore, the choice of costs seeks to investigate the appropriateness of the company's costing system.

Namely, it is known that most companies still use traditional costing systems, both for financial and management accounting purposes. However, changes immanent to the modern business environment question the ability of these systems to truly reflect product costs thus doubting their appropriateness for management-accounting decisions. Numerous studies have shown that traditional systems tend to overstate costs of standardized products in large series and understate costs of more customized products in small series. Pricing decisions based on such biased costs may prove to be fatal for the company.

2 The use of ABC model in price-setting decisions – practical illustration

We illustrate the benefits of ABC costing for price-setting decisions using the hypothetical example of a prune producing company. The company produces two products of uniform quality – prunes with pits and prunes without pits. Necessary raw materials are purchased on the market and delivered to the company. Same raw materials are used for both products (fresh plums of the same sort and quality). Raw materials are entirely processed and all products are sold. The company produced 300.000 kg of prunes with pits and 96.000 kg of prunes without pits, processing 300.002,4 kg and 128.572,46 kg of fresh plums, respectively. Due to seasonal nature of the production process, the company engages several administrative and technical employees during the year and hires seasonal workers during the prune-drying season. Products are sold in bulk and selling prices are set on the market (per kg), predominately according to the product quality. Additional information necessary for the analysis is elaborated below.

2.1 Profitability report based on traditional costing information

Tracing the costs “*traditional way*” i.e. using volume-driven allocation bases, to assign incurred costs to individual products, resulted in the product and overall profitability as presented in table 1.

Tab. 1: Product and overall profitability report (traditional costing)

	Prunes with pits	Prunes without pits	Total
Production and sales volume (kg)	300.000	96.000	396.000
Selling price (EUR/kg)	1,25	1,67	-
Revenue from sale (EUR)	375.000	160.000	535.000
Direct labor (EUR)	32.288	13.838	46.125
Direct material (EUR)	91.875	39.375	131.250
Overhead	168.247	72.106	240.353
Total expenses (EUR)	292.410	125.318	417.728
Cost price (EUR/kg)	0,97	1,31	-
Gross profit (EUR)	82.590	34.682	117.272
Gross profit (% sales)	22,02%	21,68%	21,92%

Source: author’s calculation

Direct labor costs include the compensations paid to seasonal workers, while direct material costs comprise the purchase price of raw materials used. These costs were allocated to products according to the production volume. Overheads were traditionally allocated using the uniform overhead allocation rate of 183.13% (direct material being the criteria). Accordingly, profitability report based on the traditional costing information revealed very similar profitability for both products. However, differences in the production technology of these products may encourage the management to suspect the validity of such findings.

2.2 Characteristics of the prune production technology

Prune production process includes the following phases¹: (1) harvest and transport to the drying facilities; (2) preparation; (3) drying and (4) post drying operations. Since the company purchases necessary raw materials which are delivered to its premises, phase one is not relevant for the analysis. Within the second phase, we can identify several activities²: (1) reception and inspection; (2) washing and inspection; (3) classing and (4) placement on the drying frames. The company owns a batch dryer; one batch consists of ten wagons, each of them containing

¹ adapted according to Dedijer (2009) and Markovic (2009)

² ibid

ten drying frames (3.6m² surface; 13.89kg of fruit per m²). Pitting of prunes without pits is performed prior to drying, thus decreasing the drying time. Different drying times of two products forbid their simultaneous drying i.e. one batch always contains one product alone. Assumed drying period is 20 hours for prunes with pits and 6 hours for prunes without pits. The post drying phase includes the following activities³: (1) wagons removal and cooling; (2) disinsection; (3) storage and conditioning; (4) washing; (5) pasteurization; (6) removal of surface water; (7) conserving and (8) packing and storage. Final activities are identical for both products, except the ongoing inspections which are more strict and last longer for prunes without pits.

2.3 Profitability report based on ABC costing information

Recognizing distinctive activities within the prune production cycle enabled the application of the ABC model i.e. tracing incurred costs to specific activities in the first and allocating them to products in the second stage. Identifying activities can be challenging, as the food industry's manufacturing process is complicated and consists of many related activities (Kabinlapat and Sutthachai, 2017). ABC revealed the differences in cost consumption between two products and reported the following product and overall profitability (table 2).

Tab. 2: Revised product and overall profitability report (ABC costing)

	Prunes with pits	Prunes without pits	Total
Production and sales volume (kg)	300.000	96.000	396.000
Selling price (EUR/kg)	1,25	1,67	-
Revenue from sale (EUR)	375.000	160.000	535.000
Direct labor (EUR)	0	0	0
Direct material (EUR)	99.432	31.818	131.250
Labor (supporting activities) (EUR)	32.476	13.649	46.125
Gas (EUR)	109.821	13.179	123.000
Electricity (EUR)	18.304	2.196	20.500
Depreciation of property and equipment (EUR)	35.166	8.012	43.178
Other indirect expenses (EUR)	47.924	690.107	6.441.000
Total expenses (EUR)	343.122	74.606	417.728
Cost price (EUR/kg)	1,14	0,78	-
Gross profit (EUR)	31.878	85.394	117.272
Gross profit (% sales)	8,50%	53,37%	21,92%

Source: author's calculation

³ ibid

As opposed to the traditional system, ABC model recognized that seasonal workers are not directly engaged in the production itself; they actually perform production-supporting activities, thus the ABC reported zero direct labor costs and allocated the costs of seasonal compensations to products according to the type of activity performed by the engaged workers and its duration. We assume the drying season lasts 30 days and that seasonal workers are engaged during 32 days. The company hires 30 people. There are 7 effective working hours per day; total amount of available worker-hours being 6.720. The company processed 30 batches of prunes with pits (300.000kg of product) and 12 batches of prunes without pits (96.000 kg of product). Assuming the supporting activities for prunes without pits last 8 hours longer, ABC recognized that prunes without pits consumed 1.988,57 worker-hours, while prunes with pits consumed 4.731,43 worker-hours, and allocated seasonal labor costs accordingly.

As for the overheads, assumingly comprising gas, electricity, amortization and other general expenses, ABC recognized the duration of the production process as an allocation criteria (6 hours and 12 batches of prunes without pits; 20 hours and 30 batches for prunes with pits), save for the amortization expenses, where the amortization of the pitting equipment was allocated to prunes without pits solely.

Allocating costs to those activities that actually triggered them, and charging the products only with costs of activities involved in their production, ABC reported significantly different product profitability, compared to the profitability report of the traditional model.

2.4 Discussion

Traditional costing systems use volume-based allocation bases to assign costs to individual products and customers. However, many of the products' and customers' resource demands are not volume-proportional nowadays. Thus, traditional costing systems fail to accurately measure costs incurred in the design, production, sale and delivery of finished products to customers. Consequently, as noted by Cooper and Kaplan (1998), in a multi-product range setting, management is basing important decisions about pricing, product mix, and process technology, on distorted cost information and without any actual awareness that product costs are poorly captured. Most companies detect the problem only after their competitiveness and profitability have deteriorated (Cooper and Kaplan, 1998).

Revealing the links between particular activities and demands they make on company's resources, ABC provides the management with a clear picture of how products, brands, customers, facilities, regions, or distribution channels generate revenues and consume resources (Cooper and Kaplan, 1991). Thus, ABC represents a far more flexible cost model to capture the

complexity of company's operations (Kaplan and Anderson, 2004). As our example shows, recognizing the fine variations of the production process characteristics, ABC managed to closely and more precisely portray the actual costs of both products, thus revealing their surprisingly different profitability rates.

Updated profitability picture provided by the ABC-based report can help the management to better tailor their future actions towards long-term creation of value. Namely, the knowledge on the differences in profitability rates of the two product, the management could consider favoring the production of more profitable prunes without pits, providing that other factors (such as market demand) also promote this strategy. Additionally, ABC analysis can help the management focus their attention on improving those activities that will have the biggest impact on the bottom line (Cooper and Kaplan, 1991). Namely, activity analysis enables the management to better understand the nature of causal relations between costs, activities and products, thus providing the insights into the existence of possible value-deteriorating activities within a company. This way, the management can focus on the improvement, replacement or even abandonment of such activities, taking care not to jeopardize product performance (or preferably promoting it).

Additionally, the ABC approach enables the management to better respond to customer demands long-term, and to estimate and control future costs on a more reliable basis. Using the ABC method, the management can design the product controlling its costs in the limits set by the market signals and targeted profit. This is especially important having in mind the fact that even more than 80% of product costs are set in its research, design and development phases (Malinic et al., 2013). Thus, allowing the management to match different types of activities (controlling their expenses) with specific product characteristics required by the customers, ABC analysis opens new possibilities for cost reductions and profitability management, which were virtually impossible in the traditional setting. Consequently, the use of activity-based costing approach provides almost unlimited possibilities for scenario analyses the management may take on the road to the optimum price for each product and each customer. Providing the data on the cost price of each individual activity, the management can clearly determine the cost price of particular product characteristics and every individual customer service. With such information at their disposal, the management can actually differentiate the price list for its product range, setting the base price for the "basic" product with elementary features, and determining price increments for each additional product feature or customer service. This way, enabling the control of both product and customer profitability, ABC sets a foundation for a

secure maneuver between the targeted profit and satisfied customer, creating the presumption for optimum pricing decisions.

Conclusion

Building on earlier researches on the impact of costs and market signals on pricing decisions, this paper analyzes the possibilities, scopes and benefits of the ABC costing information in setting the selling prices. Using a hypothetical example of a company that produces two products whose prices are set on the market, our analysis shows how ABC costing, by allocating costs to specific activities and charging products only with costs of actually consumed activities, provides the management with far more realistic information on the product costs, thus enabling them to analyze product and overall profitability in a more realistic fashion, and to adjust its future decisions accordingly (composition of the product assortment, possible abandonment of certain activities, redesign of the existing production process, cancellation of existing or introduction of new customer services etc.). Practically, detailed cost information provided by the ABC enables the management to adjust the selling price to each specific product characteristic and every customer request. This way, ABC model opens completely new horizons when it comes to profitability management, tracing the profitability to product and customer levels.

Assuming that a significant portion of modern managers still uses traditional costing information for management decisions, another idea of this paper was to stress the importance of reliable costing information, highlighting the benefits of ABC costing approach. Having in mind the results of research presented in the first part of this paper, we believe that the mere cognition on the principles and logic behind the ABC costing model can help the management improve their product cost analysis and, consequently, lead them towards the optimum selling prices.

It should be noted however that hypothetical example designed for the purpose of our analysis is based on a significant level of generalization. In that sense, a more detailed analysis would imply precise measurements of the necessary time for each supporting activity, specifying the exact number of employees engaged in those activities. Further research may be undertaken to broaden the analysis and include the activities of the whole supply chain, including purchase and post-sale activities. In this sense, ABC costing can serve as a remarkable mean for reconciliation of competing interests of producers, suppliers and customers, revealing the supply chain as a win-win game.

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