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COST MANAGEMENT USING ACTIVITY-BASED COSTING MODEL

Many companies are currently using the traditional methods of cost calculation. The problem with this kind of calculations is just the overhead costs which form a significant part of companies own total costs. Their inaccuracy is eliminated by Activity-Based Costing (ABC) calculation method. The paper is focused on one of the biggest contributions of ABC model – linking accounting costs with performed activities and with costs of manufactured products into one system. We present our own ABC model in a selected company as well as the comparison of results achieved by this calculation with those achieved by traditional cost calculations. The paper also offers the authors' survey aimed at the use of calculation methods and their software support in companies.

Keywords: cost management; activity-based costing; allocation of costs to activities.

JEL classification: M21; M41.

Ленка Худакова Сташова, Радослав Баюс УПРАВЛІННЯ ВИТРАТАМИ НА ОСНОВІ МОДЕЛІ ОБЛІКУ ВИТРАТ ЗА ВИДАМИ ДІЯЛЬНОСТІ

У статті показано відмінності між обліком витрат за видами діяльності та традиційним обліком. Новітній метод ведення витрат за видами діяльності дозволяє підвищити точність обліку. Головна перевага моделі ABC – зв'язок витрат на діяльність та витрат на продукти, що виробляються, в єдину систему. Процедури обліку витрат детально описано на прикладі бухгалтерії пекарні, результати розрахунків за даним методом порівняно з результатами традиційної системи обліку. Окремо коротко представлено результати опитування щодо використання системи обліку на підприємствах та відповідного програмного забезпечення.

Ключові слова: управління витратами; облік витрат за видами діяльності; розподіл витрат за видами діяльності.

Табл. 12. Літ. 14.

Ленка Худакова Сташова, Радослав Баюс УПРАВЛЕНИЕ ЗАТРАТАМИ НА ОСНОВЕ МОДЕЛИ УЧЁТА ЗАТРАТ ПО ВИДАМ ДЕЯТЕЛЬНОСТИ

В статье показаны различия между учётом затрат по видам деятельности и традиционными способами ведения бухгалтерии. Новейший метод ведения затрат по видам деятельности позволяет повысить точность учёта. Главное преимущество модели ABC – связь затрат на производимую деятельность и расходов на производимые продукты в единую систему. Процедуры учёта затрат подробно описаны на примере бухгалтерии пекарни, результаты расчётов по данному методу сравнены с результатами традиционной системы учёта. Отдельно кратко представлены результаты опроса об использовании системы учёта на предприятиях и соответствующего программного обеспечения.

Ключевые слова: управление затратами; учёт затрат по видам деятельности; распределение затрат по видам деятельности.

Introduction. For effective management, it is necessary to know which products are the most profitable and which on the contrary produce loss, and another important thing is to know how much individually performed activities cost and whether they are performed effectively. Managers often focus only on direct costs manage-

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ment (material, wages) and pay insufficient attention to indirect overhead costs that have a large share in the from the total costs of a company (Popesko, 2012).

Literature review. Activity-based costing is an approach to solve problems with traditional cost management systems. These traditional costing systems are often unable to determine accurately the actual costs of production and the costs of the related services. Consequently, managers are making decisions based on inaccurate data, especially where there are multiple products. Instead of using broad arbitrary percentages to allocate costs, ABC seeks to identify cause-effect relationships to assign costs objectively. Once costs of activities are identified, the cost of each activity is attributed to each product to the extent that the product uses the activity. In this way ABC often identifies the areas of high overhead costs per unit and so directs attention to finding the ways to reduce costs or to charge more for costly products (Kaplan and Anderson, 2005; 2007).

Activity-based costing is a new method of calculating costs of individual processes, products and customers, which eliminates the inaccuracies of traditional methods of the last century (overhead calculations, covering post) (Vescicik, 2004; 2012).

Activity-based costing is a universal management instrument used not only for the purposes of cost calculations, but represents a tool enabling effective cost reduction. In addition to these advantages, the ABC method has also restrictions as it is more demanding in terms of volume and structure of data processing. In case of its application, it is necessary to consider carefully all the benefits and costs associated with its implementation (Popesko, 2010; 2012).

The ABC method is a progressive instrument of controlling. It enables assigning costs to products according to actually used activities and resources. The method is designed for more accurate scheduling of indirect costs (overheads); as a schedule using the causal relationship between activities (processes) and individual performance (Foltinova, 2011).

The key principle of ABC is placing activities among the source costs (taken over from the accountancy) and products. One of the biggest benefits of the ABC system is the interconnection of costs arising from accounting, processes and costs of products into one system (Vescicik, 2012).

Problem statement. This survey is focused on companies in the food industry. We found that overhead costs represent a high proportion of own total costs. The survey included 40 companies operating in the food industry in Kosice self-governing region in Slovak Republic. 57% of the respondents answered their proportion of overhead costs is 21–30%. 25% of the respondents answered that they have the overhead costs in the amount of 31–40%. 31% of the analyzed companies consider distorting calculation to be the cause of a highly calculated proportion of overhead costs. 81% of the companies use traditional methods of calculations and 63% do not use any kind of software for calculations. In such a case it is necessary to innovate, modernize the way of looking at overhead costs as well as the way of their calculation.

The aim of this paper is to discuss one of the biggest contributions of ABC model – linking the accounting costs with performed activities and with costs of manufactured products into one system. We create a model by means of the generally defined procedure of method implementation into the company. The selected procedure: the preparatory phase, specification of activities, aggregation of activities into actions,

resources identification, the first stage of allocation – cost calculation into activities, creation of structure of a cost flow, identification of activity centres, products specification, the second stage of allocation – cost calculation into products, results evaluation. Model simulation of calculation is realized in a company operating in the food industry, specifically the bakery, which is called Pekaren Chlebig, s.r.o. – for the purposes of this model. The bakery keeps the double-entry bookkeeping and partial analytical classification of costs.

Creation of activity-based costing model. The first step – *the preparatory phase* is actually the familiarization with the company, its accounting system and calculations.

1. Specification of performed activities, aggregation of activities into actions. The company will be divided by individual activities performed. In this way we can identify e.g. duplicate the performed activities or the activities carried out unnecessarily. After thorough analysis of the bakery’s functioning, we can specify the basic activities which we have subsequently merged into 8 actions (Table 1).

Table 1. Specified activities and aggregation of activities into actions, authors' own processing

Actions	Activities
Purchase of material (supply) A1	purchase and delivery of raw materials and auxiliary material (flour, yeast, leaven, milk, potato flakes, salt, cumin and other spices, sugar, malt, oil, starch, raisins, cocoa, poppy), materials take-over, inspection and quality evaluation, purchase of protective equipment (clothing, shoes, gloves, hats), purchase of cleaning material, spare parts, maintenance material, keeping stock records and stock inventory
Preparation of dough A2	flour sieving, ingredients weighing, dough kneading, dough maturing in leaven machines and dough mixing
Cutting and forming dough A3	checking dough weight according to individual products (adding or removing), manual forming of dough by means of rollers and rolling machines, sprinkling with starch and placing into baskets, aerating, kneading and forming dough (into loaf, veka, forming rolls, challot), placing into heat (dough rising)
Adjustment before baking A4	brushing with water, egg, products labelling (by letters, numbers, notches in dough), turning, sprinkling, adding sugar water, oil, topping
Baking of bread and bakery products A5	manual placing into oven, baked goods and baking space moistening, setting and control of temperature, backing time watching, moving of bread in oven, baked goods moistening after removing from oven, placing into boxes
Ancillary activities A6	cleaning of baking trays and other baking tools, oven cleaning, washing bakery premises, work tables, daily technical maintenance and repairs of machines and ovens
Sale of products A7	cutting, packing of bread, preparation for sale, placing into boxes, placing into cars, delivering of bakery products by cars
Business management A8	receiving orders, communication with suppliers and customers, filling in delivery notes and invoices, quality control, PC processing of information, recording receivables and obligations, payments, accounting, communication with various authorities, regulation of production, supply and sales

2. First Stage of Cost Allocation. After specification of activities in a given company we can continue with resources identification. If the company keeps accounts

with consistent analytical monitoring of various kinds of costs, in most cases it is possible to identify costs on the basis of accounts by individual types. If the company keeps detailed analytical records of costs, only preliminary list of general costs is made, and later during work it is gradually supplemented and specified. In our case we have specified the costs types on the basis of relatively detailed analytical records. Such identification is followed by the first stage of cost allocation in the ABC model – allocation of costs to specified activities (aggregated into actions). First, we determine the mutual relations between costs and actions, it means that in Table. 2 we indicate which action requires incurrence of which cost.

Table 2. **Mutual relations between resources and actions,**
authors' own processing

RESOURCES	ACTIONS							
	A1	A2	A3	A4	A5	A6	A7	A8
Material consumption								
- fuels, oils and lubricants	X						X	X
- protective equipment		X	X	X	X	X	X	
- cleaning and tiny material for production halls maintenance						X		
- material for administration building maintenance								X
- material for daily technical works								
- maintenance and repairs of machines and ovens						X		
- cleaning material for production facilities maintenance						X		
Electric energy consumption								
- baking during day shift		X	X		X			
- baking during night shift		X	X		X			
- other energy consumption								X
Consumption of other unstored supplies								
- water						X		X
Labour costs								
- wages for management								X
- wages for daily technical maintenance and repairs						X		
- wages for the truck driver	X						X	
Depreciation								
- production facilities, machines, ovens		X	X	X	X			
- administration buildings and warehouses	X							X
- production halls		X	X	X	X			
- trucks	X						X	
- passenger vehicles								X
- equipment of administration buildings								X
Other expenses on economic activity								
Operating costs:								
- buildings (insurance, immovable property tax, heating costs)	X	X	X	X	X			X
- motor vehicles	X						X	X

X is assigned to those kinds of costs which are incurred by carrying out the specified activities. E.g.: fuels, oils and lubricants are consumed when purchasing material, selling products as well as managing business. Protective equipment is consumed

during A2–A7 activities because here workers come in contact with food and therefore must use protective wear like gloves, hats, shoes and white clothing. Electric energy consumption is required mainly by A2 and A5 manufacturing activities and A8 – business management. Energy is consumed mainly during electrical machine kneading of dough and baking in ovens. Other activities require electric energy consumption only for lighting, what is negligible when compared with energy consumption during kneading and baking. Therefore, we allocate all other consumption to "Business management" activity. Water consumption is required by A6 and A8 activities. It is consumed during cleaning and washing of machines, halls as well as during tidying-up works. Labour overhead costs are consumed by A8 activities (wages for management), A6 (wages for daily technical maintenance and repairs) and also by A1 and A7 activities (wages for the truck driver). Depreciation of production facilities, machines and ovens is required by manufacturing activities, mainly preparation of dough and baking (they use bigger and more expensive machines and equipment), these activities also require the depreciation of production halls. Other depreciation is related to administration and vehicles – accordingly we have indicated the consumption of these costs in various activities. Costs connected with operation of buildings were evoked by these activities: purchase of material A1 (mainly the insurance of warehouses, immovable property tax), all manufacturing activities (mainly production halls tax and heating costs), business management A8 (immovable property tax, heating). Costs on vehicle tax are required by the activities in which motor vehicles are used – passenger vehicles as well as trucks. Table 3 shows the drivers of the first stage, which are used in allocating costs to activities (the first stage of cost allocation).

The costs on direct material represent the consumed basic or auxiliary material in production (flour, yeast, leaven, milk, potato flakes, salt, cumin and other spices, sugar, malt, oil, starch, raisins, cocoa, poppy). This consumption can be accurately specified according to recipes and technological procedures. Direct material is thus allocated directly to products; it does not enter the created ABC model. In our proposed model we present the qualified estimations, which are own estimations of drivers. They were created after consultation with bakery workers. Fuels, oils and lubricants as costs monitored on the analytical account to account "Material consumption" can be divided by the use of data from rides records. In this way we can find out the kilometres driven when purchasing basic as well as auxiliary materials and kilometres driven when selling products, it means when delivering the bakery products by cars. We can also find out the kilometres driven by cars used during business management. On the basis of these data or in combination with qualified estimation we can determine the proportion of division of these costs into activities. Various kinds of protective equipment last for different periods of time, therefore in case of these costs it is suitable to use the qualified estimation based on previous experience, or it is also appropriate to use the experiences of other companies. Cleaning and materials for production halls maintenance are in full amount allocated to "Ancillary activities", as these include cleaning of manufacturing areas. Material for the maintenance of administration building is in full amount allocated to A8 activity – "Business management". Material for daily technical maintenance and repairs of machines and ovens is in full amount allocated to "Ancillary activities" that fully involve these activities. Costs on cleaning materials for production facilities maintenance are also allocated

Table 3. First stage drivers, authors' own processing

RESOURCES	TOTAL COSTS, EUR	ACTIONS, %							
		A1	A2	A3	A4	A5	A6	A7	A8
Material consumption									
- fuels, oils and lubricants	465	35							45 20
- protective equipment	105		18	18	18	18	18	10	
- cleaning and materials for production halls maintenance	88						100		
- material for maintenance of administration building	45								100
- material for daily technical maintenance and repairs of machines and ovens	72						100		
- cleaning materials for maintenance of production facilities	113						100		
Electric energy consumption									
- baking during day shift	265		20	10		70			
- baking during night shift	214		20	10		70			
- other energy consumption	44								100
Consumption of other unstored supplies									
- water	95						80		20
Labour costs									
- wages for management	2313								100
- wages for daily technical maintenance and repairs	400						100		
- wages for the truck driver	650	40						60	
Depreciation									
- production facilities, machines, ovens	870		22	22	22	34			
- administration buildings and warehouses	415	50							50
- production halls	380		25	25	25	25			
- trucks	360	40						60	
- passenger vehicles	270								100
- equipment of administration buildings	120								100
Other expenses on economic activity									
Operating costs:									
- buildings (insurance, immovable property tax, heating costs)	114	15	13	13	13	13			33
- vehicle tax	18	30						40	30
	7416								

to "Ancillary activities". In case of costs on the consumption of electric energy we come out from the fact that most energy is consumed during baking in electric ovens. As the bakery monitors the accurate records of electric energy consumption according to the machines inputs, we divided these costs into baking in the day shift, baking in the night shift and other consumption. Using these data and partially also qualified estimation, the costs on baking in the day and night shift are allocated to A2, A3 and A5 activities, mainly activity A5. Whole other energy consumption is allocated to business management. energy consumption on other activities is negligible. Water consumption monitored on account 503, is divided by the qualified estimation into

A6 and A8 activities in the proportion of 80:20. Most water is consumed during ancillary activities like cleaning and washing of facilities.

Wages of manufacturing workers are considered to be direct costs, therefore, at the beginning of model creation they were separated from the overhead costs. Direct wages are allocated directly to products on the basis of their demands on work according to a number of products pieces. Management wages are in full amount allocated to business management. Wages for daily technical maintenance and repairs are in full amount allocated to "Ancillary activities" and wages for the truck driver are divided into "Purchase of material" and "Sale of products" in the proportion 40:60. Depreciation of production facilities, machines and ovens is allocated to manufacturing activities by a qualified estimation according to the use of facilities and machines in various activities. Depreciation of administration buildings and warehouses is divided in the same proportion to activities "Purchase of material" (purchased material is stored in 2 warehouses) and "Business management". Depreciation of production halls is divided in the same proportion to all manufacturing activities, it means A2–A5. Depreciation of trucks is allocated to "Purchase of material" and "Sale of products" in the same proportion as costs on driver's wages (40:60), it means depending on the frequency of cars use on various activities. Depreciation of passenger vehicles is in full amount allocated to A8 activity. The same applies to equipment depreciation in administration buildings. Costs connected with buildings operation are divided by qualified estimation based on the area of individual buildings. 15% of these costs is allocated to activity A1, 33% of costs is allocated to A8 – "Business management" and 52% to production (these 52% were evenly divided to manufacturing activities A2–A5, 13% for each). The vehicle tax is divided by qualified estimation in combination with data from the driver's log, where we can find out which motor vehicles are used for activities and what is the frequency. On the basis of information from drivers we can divide the costs to activities (Table. 4). After this assignment the next phase follows – structure creation for costs flow. Some activities carried out in the company come into direct contact with products; other activities must be carried out to ensure the activities coming into contact with products. It means that the first group of activities has a direct relation to products and the second group is only a mediator. Activities which have no direct relation to products are at this stage assigned to other activities. The relations between activities in our analyzed bakery are shown in Table 5.

By the analysis of relations of all activities to products, we found that activity A1 ensures the purchase of basic as well as auxiliary materials for activities A2, A4 and A6. Activities A2–A5 are the manufacturing activities, so they come into direct contact with production. The costs of these activities are therefore not allocated to any other activities. Ancillary activities (A6) include mainly cleaning works for production, maintenance of machines as well as tidying-up works. A6 is therefore a supporting activity; its costs are allocated to activities A2–A5. A7 is not a direct manufacturing activity but at the same time it is not a supporting activity for others. Its costs are therefore not allocated to other activities. A8 represents the administrative overheads; therefore, it is suitable to allocate its costs to all other activities. The next stage is the division of costs of each of the selected supporting activities in a separate step. First, we allocate the costs of A8, it means of the activity which represents the activity with

Table 4. Allocation of costs to activities, authors' own processing

RESOURCES	TOTAL COSTS, EUR	ACTIVITIES, EUR										
		A1	A2	A3	A4	A5	A6	A7	A8			
Material consumption												
- fuels, oils and lubricants	465	162.75									209.25	93.00
- protective equipment	105		18.9	18.9	18.9	18.9	18.9	18.9	18.9	88.00	10.5	
- cleaning and materials for production halls maintenance	88											
- materials for administration building maintenance	45											45.00
- material for daily technical maintenance and repairs of machines and ovens	72									72.00		
- cleaning materials for production facilities maintenance	113									113.00		
Electric energy consumption												
- baking during day shift	265		53.00	26.50						185.50		
- baking during night shift	214		42.80	21.40						149.80		
- other consumption of energy	44											44.00
Consumption of other unstored supplies												
- water	95									76.00		19.00
Labour costs												
- wages for management	2 313											2 313
- wages for daily technical maintenance and repairs	400									400.00		
- wages for the truck driver	650	260.00									390.00	
Depreciation												
- production facilities, machines, ovens	870		191.40	191.40	191.40	191.40	191.40	295.80				207.50
- administration buildings and warehouses	415	207.50										
- production halls	380		95.00	95.00	95.00	95.00	95.00	95.00				
- trucks	360	144.00									216.00	
- passenger vehicles	270											270.00
- equipment of administration buildings	120											120.00
Other expenses on economic activity												
Operating costs:												
- buildings (insurance, immovable property tax, heating costs)	114	17.10	14.82	14.82	14.82	14.82	14.82	14.82				37.62
- vehicle tax	18	5.40									7.20	5.40
Total costs, EUR	7416	796.75	415.92	368.02	320.12	759.82	767.90	832.95	767.90	832.95	3154.52	

final costs. Costs from this activity are divided by qualified estimation (after consultation with particular administrative staff) of time devoted by these workers to other activities (Table 6). In the same way we allocate the costs of activity A1 to other activities that are superordinate to it (marked with a cross). A1 ensures the purchase of basic and auxiliary material for activities A2, A4 and A6. According to the quantity of material purchased and stored for these 3 activities in combination with qualified estimation of the amount of work carried out for these activities, we allocate the costs of activity A1 (Table 7). It is important to consider the fact that costs of activity A6 can be allocated only after allocation of costs A1, since A1 is superordinate to activity A6. The similar driver as in the case of "Business management" activity will be used here (Table 8).

Table 5. Relations between activities, authors' own processing

Activities	Activities							
	A1	A2	A3	A4	A5	A6	A7	A8
A1		X		X		X		
A2								
A3								
A4								
A5								
A6		X	X	X	X			
A7								
A8	X	X	X	X	X	X	X	

3. Second Stage of Cost Allocation. The next phase is products specification. In the analyzed company we specify the following products: sliced sunflower bread, wheat rye bread, sliced potato bread, rolls (containing fat), challah, veka, poppy brioche. In the observed month, the bakery in which we are creating the ABC model produced: sliced sunflower bread – 2700 pcs, wheat rye bread – 4500 pcs, sliced potato bread – 2700 pcs, rolls – 15000 pcs, challah – 4500 pcs, veka – 2400 pcs, poppy brioche – 6000 pcs (Table 9).

Now we are doing the second stage of allocation, it means the actual calculation of costs to products.

The costs of manufacturing activity A2 will be allocated to products by the help of a driver, for which we chose products' weight. We will divide the total costs of activity A2 into 7 products by the proportion of 2700 : 4500 : 2700 : 600 : 3150 : 864 : 480. The costs of manufacturing activity A3 will be divided by the help of a driver of time devoted to this activity for individual products. We take into account the labour content for individual products, it means the formation of loaves for 3 types of bread, formation of rolls and poppy brioche. The labour content expressed in minutes is multiplied by the number of produced pieces, so the costs are divided by proportion of $2700 \times 5 : 4500 \times 5 : 2700 \times 5 : 15000 \times 1.5 : 4500 \times 6 : 2400 \times 3 : 6000 \times 2$. The driver for cost allocation of activity A4 is also time devoted to this activity in various products. For all products this time equals 1 minute, in case of a roll it is 0.5 minutes. Costs are therefore divided by the proportion of 2700 : 4500 : 2700 : 7500 : 4500 : 2400 : 6000. For the activity A5 we chose a driver of baking time of products. Time chosen for the driver is calculated for 1 piece – bread is baked for 35 minutes, but 15 pieces are baked in the oven at the same time, so for example the baking time for

Table 6. Allocation of costs to activities A8, authors' own processing

Activities	Total costs of activities, EUR	Activities, EUR							
		A1	A2	A3	A4	A5	A6	A7	A8
Total costs of activities		796.75	415.92	368.02	320.12	759.82	767.90	832.95	3 154.52
A1	796.75								
A2	415.92								
A3	368.02								
A4	320.12								
A5	759.82								
A6	767.90								
A7	832.95								
A8	3154.52	1245.52	158.50	158.50	158.50	321.00	954.00		
Total costs, EUR	7416	2042.27	574.42	526.52	478.62	918.32	1088.90	1786.95	

Table 7. Allocation of costs to activities A1, authors' own processing

Activities	Total costs of activities, EUR	Activities, EUR							
		A1	A2	A3	A4	A5	A6	A7	A8
Total costs of activities		2042.27	574.42	526.52	478.62	918.32	1088.90	1786.95	
A1	2042.27		1542.00		214.00		286.27		
A2	574.42								
A3	526.52								
A4	478.62								
A5	918.32								
A6	1088.90								
A7	1786.95								
A8									
Total costs, EUR	7416		2116.42	526.52	692.62	918.32	1375.17	1786.95	

Table 8. Allocation of costs to activities A6, authors' own processing

Activities	Total costs of activities, EUR	Activities, EUR							
		A1	A2	A3	A4	A5	A6	A7	A8
Total costs of activities			2116.42	526.52	692.62	918.32	1375.17	1786.95	
A1									
A2	2116.42								
A3	526.52								
A4	692.62								
A5	918.32								
A6	1375.17		309.00	335.00	136.00	595.17			
A7	1786.95								
A8									
Total costs, EUR	7416		2425.42	861.52	828.62	1513.49		1786.95	

Table 9. Mutual relations between activities and products, authors' own processing

Activities	Activities						
	A2	A3	A4	A5	A6	A7	A8
Sliced sunflower bread	x	x	x	x	x	x	x
Wheat rye bread	x	x	x	x	x	x	x
Sliced potato bread	x	x	x	x	x	x	x
Roll (containing fat)	x	x	x	x	x	x	x
Challah	x	x	x	x	x	x	x
Veika	x	x	x	x	x	x	x
Poppy brioche	x	x	x	x	x	x	x

Table 10. Calculation by ABC method, authors' own processing

Products	Number of pieces	Weight, kg	Time on the activity A3 for 1 piece, min	Baking time (A5) for 1 piece, min	Activity, EUR					Total costs, EUR	Costs per unit, EUR	
					A2	A3	A4	A5	A7			
Overall costs						2425.42	861.52	828.62	1513.49	1786.95	7416.00	
Sliced sunflower bread	2700	2700	5	2.66	434.43	98.42	73.85	241.10	321.84	1169.54	0.433	
Wheat rye bread	4500	4500	5	2.66	725.67	164.03	123.08	401.83	536.40	1950.89	0.434	
Sliced potato bread	2700	2700	5	2.66	434.43	98.42	73.85	241.10	321.84	1169.54	0.433	
Roll (containing fat)	15000	600	1.5	0.3	106.79	164.03	203.08	151.07	71.52	698.36	0.047	
Challah	4500	3150	6	2	509.67	196.83	123.08	302.13	375.48	1506.85	0.335	
Veka	2400	864	3	1.25	137.37	52.49	65.64	100.71	102.99	458.93	0.191	
Poppy brioche	6000	480	2	0.375	77.66	87.48	164.10	75.53	57.22	461.89	0.077	

Table 11. Total costs of products, authors' own processing

Products	Number of pieces	Direct costs, EUR	Indirect costs from ABC model, EUR	Total costs, EUR	Total costs for 1 piece in EUR
Sliced sunflower bread	2700	1665.35	1169.54	2834.89	1.05
Wheat rye bread	4500	1469.21	1950.89	3420.1	0.76
Sliced potato bread	2700	1935.33	1169.54	3104.87	1.15
Roll (containing fat)	15000	202.85	698.36	901.21	0.06
Challah	4500	3442.25	1506.85	4949.1	1.10
Veka	2400	2419.99	458.93	2878.92	1.20
Poppy brioche	6000	441.1	461.89	902.99	0.15

Table 12. Comparison of ABC method and traditional method, authors' own processing

Products	Number of pieces	Direct costs, EUR	Direct labour costs, EUR	Total overhead costs, EUR	Overhead costs per unit, EUR	Overhead costs from ABC model, EUR	Difference in %
Total costs		11576.08	6816.72	7416.00			
Sliced sunflower bread	2700	1665.35	997.05	1084.70	0.402	0.433	+7.16
Wheat rye bread	4500	1469.21	919.43	1000.26	0.222	0.434	+48.85
Sliced potato bread	2700	1935.33	1231.97	1340.28	0.496	0.433	-14.55
Roll (containing fat)	15000	202.85	139.88	152.18	0.010	0.047	+78.72
Challah	4500	3442.25	2037.61	2216.74	0.493	0.335	-47.16
Veka	2400	2419.99	1354.23	1473.28	0.614	0.191	-221.47
Poppy brioche	6000	441.1	249.13	271.03	0.045	0.077	+41.56

1 piece of sunflower bread is 40 / 15 (2.66 minutes). The roll is baked for 15 minutes, and 50 pieces are baked in the oven at the same time, so 1 piece is baked for 0.3 minutes. Challah is baked for 30 minutes, 20 pieces are baked at the same time so one challah is baked for 2 minutes. Veka is baked for 25 minutes, 20 pieces are baked at the same time, it means that 1 piece is baked for 1.25 minutes. Poppy brioche is baked as long as rolls – 15 minutes, and 40 pieces are baked at the same time, 1 piece is therefore baked for 0.375 minutes. Thus, the driver is the proportion of $2.66 \times 2700 : 2.66 \times 4500 : 2.66 \times 2700 : 15000 \times 0.3 : 4500 \times 2 : 2400 \times 1.25 : 6000 \times 0.375$. Activity "Sale of products" is allocated on the basis of weight of individual products, as it includes mainly loading and delivering of products (it means the proportion of $2700 : 4500 : 2700 : 600 : 3150 : 864 : 480$). In this way we can calculate the overhead costs on individual products (Table 10).

Total costs on the analyzed products can be found by adding direct costs. The amount of direct costs as well as the total costs calculation is shown in Table 11.

Conclusion. The result which we have achieved by ABC calculation will be compared in conclusion with the results of traditional surcharge method calculation used by most companies in this industry. As cost allocation base for surcharge calculation we will use direct wages.

Surcharge (percentage of allocation) of overhead costs to products will be calculated like this: $\text{overhead costs} / \text{direct labour costs} = 7416.00 / 6816.72 = 1.087913$.

By comparing of the results of the overhead costs calculations by both methods we find out that ABC method revealed some inaccuracies. The overhead costs are included in the model as follows: acquisition overhead – activity A1, manufacturing overhead – A2–A6, sales and distribution overhead – A7, administrative overhead – A8. First we allocated the overhead costs to the activities which required their incurrance and then we allocated costs on individual activities to products produced by realization of these activities, in this way we were able to remove the non-directness of overhead costs, clarified the calculation so we know which costs belong to which product. This is the aim of ABC model – to clarify the allocation of overhead costs.

The ABC model enables a detailed analysis of the adequacy of costs attributable to the product. This also allows the retrospective analysis of already allocated costs by means of looking for the undue costs of activities. Unit costs, as well as, excessive consumption of actual activities. The reverse analysis of costs, of course, won't solve all the problems related to the efficiency of performance, but it can direct the attention of managers to problem areas. According to International Association of Financial Executives Institutes ABC method is fully used by 19% of companies, by 25% of companies it is used in its modified version and 56% use its simplified version.

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