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## Implementation of Activity-Based Budgeting Method in the Economic Entities from Mining Industry of Romania

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### Abstract

The article aims to emphasize the importance of the Activity-Based Budgeting (ABB) implementation within the entities in the mining industry of Romania. Taking into account the stage of the research carried out in the literature regarding the implementation of the ABB method to the specific of the entities within the mining extractive industry and up to the current performances of various specialists, the authors of this article demonstrate the usefulness of the Activity-Based Budgeting method in the management, coordination and harmonization of the activities of the entities within the mining extractive industry in Romania and of the substantiation of decisions based on the information supplied by this method. The steps of implementation taken within Lupeni Mining Exploitation were presented. The article ends with the conclusions of the authors regarding the advantages and the importance of the implementation of the ABB method within the entities in the Romanian mining industry.

**Keywords:** Activity-Based Budgeting, Processes, Performances, Mining Industry, Reporting

### Introduction

#### *Background of the study*

The performing in a complementary and perfectly harmonized way of the organizational activities within a business entity contributes to the attainment of certain long-term competitive advantages of this entity. Operational efficiency and strategy are the two elements contributing to the success of the attainment of long-term advantages of this entity and the guarantee of the decisional success of the management team. The globalization process of the markets represents one of the greatest challenges for business entities within the mining extractive industry trying to survive and expand to the best of their abilities on the international market. On the day-to-day competitive market, the specialists in the field of management accounting must use the most efficient instruments in order to give the managers

the necessary information for the substantiation and efficient decision-making. Therefore, we consider that the Activity-Based Budgeting method contributes largely to the assurance of the transparency of costs, which are continually increasing, practically helping the business entities within the extracting mining industry to identify the profitable market, the clients/beneficiaries of the coal production and distribution channels.

### ***Aim and Objectives***

The aim of this study is to evaluate the possibilities of implementation of the activity-based budgeting in the entities within the mining extractive industry in Romania and to emphasize the advantages of its usage, especially regarding performances improvement. Currently, the Activity-Based Budgeting is observed among the business entities applying it, by the substitution of the traditional budget cycle and following the critiques brought to the budget practices used in Romania. Our attempt is offering a starting model for performing the successful implementation of the ABB method in the entities within the mining extractive industry in Romania and not only, addressing especially to the managers and specialists in the field.

### **Literature Review**

In the national and international literature, many specialists and professors referred to the activity-based budgeting method, a part of them advising for its successful implementation, others criticizing it. Regardless of their side, the great majority agree that this method represents a very useful instrument, necessary for the management, coordination and harmonization of the activities within a business entity. Thus, a part of the specialists had a real success regarding the implementation of the ABB method and keeping it operating along with the ABC method within production centers in the processing industry (Navistar and McKinney, 1999), mining industry (Lind, 2001), but also within the services industry (Tatikonda and Tatikonda, 2001; Arnaboldi and Lapsley, 2004).

### **Research Design and Methodology**

#### ***Research Questions***

This article aims to explore our attempt to implement the Activity-Based Budgeting method within Lupeni Mining Exploitation. In order to assess the level of success of the ABB method implementation within the aforementioned entity, we measured the judgment of the specialists in the field of management accounting in Romania, as well as of the multi-level managers of various state-managed entities. In other words, we tried to find answers to the following questions:

- 1. Is it possible to implement successfully the Activity-Based Budgeting method in the business entities within the mining extractive industry in Romania?*
- 2. Can the ABB method bring improvements regarding the management and harmonization of the activities in business entities within the mining extractive industry?*
- 3. Can the ABB method contribute to the increase of performances of the business entities within the mining industry?*

#### ***Instrumentation***

The design of the research is focused on treating the theoretical and methodological implications determined through the questions asked in the beginning of the study. For the relevance of the study, the following means were used: interviews with the employees (own

analyses performed by the workers directly involved in the execution of the activities), the accounting records of the business entity (by collecting data and analyzing previously collected data, analyzing the expenditure at the level of cost centers based on various records) and the examination of its internal documents (various internal cost-related reports, orders etc.), for which three categories of respondents to the questions asked were taken into consideration. The first category consists of the employees involved in the execution of specific activities, the second one consists of the specialists in the field of accounting (cost and works accountants), and the third category consists of the multi-level managers of the entities.

Before the interviews, all employees of the business entity were instructed in a training regarding the basic elements of the ABB method. A special attention was given to the workers within the departments on which the interviews focused, in order for them to become familiar with the concepts used and the analyses that the activities they execute or coordinate will be subjected to. According to the critical chain theory (Goldratt, 1997), the workers stated that their time and analysis estimations will be brought to attention by discussions with other workers directly involved in carrying out the functions or by mutual consultations or by analyzing the historical data.

### **Data Test and Analysis**

The study sample was carried out on 328 persons, according to the aforementioned categories. Following the collection of the questionnaires and the data centralization (table 1), the situation is as follows:

*Table 1.* Situation of vote option on respondent's categories

Vote option	Respondents category		
	Workers	Specialist in the field of accounting	Managers of entities
For	69.46%	88.88%	91.66%
Against	30.54%	11.12%	8.34%
Total	100.00%	100.00%	100.00%

As it can be seen, the highest number of the three categories asks for implementation of ABB method within the economic entities of mining extractive industry. Starting from this situation, our empirical study continued and the results obtained following the implementation and advantages of using ABB method are described below.

### **Activity-Based Budgeting**

#### ***Axiology of Activity-Based Budgeting***

According to international specialists, the two main axes on which the activity-based method usage is based are: Activity-Based Analysis (ABA) and Activity-Based Costing (ABC). The first axis revolves around the analysis of each function based on detailed behaviors, and the second axis focuses on setting a set of rules and procedures based on the tracking, analysis and assignment of costs on calculation objects. The ABC method follows the trajectory of the "business process", following only those processes creating value and customer satisfaction (Morrow and Hazell, 1992; Hixon, 1995; Cokins, 1999). The activity analysis emphasizes the role, importance, value and efficiency of each element of the business process and the Activity-Based Budgeting must adapt to the business process decided by the entity. For a good

implementation and functioning of the Activity-Based Budgeting, all budgets pertaining to the processes decided by the entity will be based on the two main axes previously mentioned. The basic concepts of the Activity-Based Budgeting consist of: cost variability and hierarchy, budgets flexibility and responsibilities accounting (Wilson, 1987; Kaplan, 1994; Mitchell, 1994; Wilhelmi and Kleiner, 1995; Horngren et. al., 1997).

According to the opinion of Porter and Partridge (Porter, 1996; Partridge, 1993), the Activity-Based Management is focused on the internal chain of values of the company, in order to obtain certain competitive real and strategic advantages. The development and execution of this concept is possible only with the help of the ABC (Cook et. al., 2000) approach and is based on Figure 1. Each process is structured on basic activities and support activities, a part of them being regrouped within the main ones. The resources necessary for each activity are established, totaled at a process level and then at entity level.

### **Activity-Based Budgeting vs. traditional budgeting**

Making an analogy between the Activity-Based Budgeting (ABB) and the traditional budgets (table 2), most specialists in the accounting field identified the following aspects:

*Table 2. Analogy between Activity-Based Budgeting and traditional budgeting*

<b>Activity-Based Budgeting</b>	<b>Traditional budgets</b>
<ul style="list-style-type: none"> <li>• Focus on the work volume and of the costs of processes</li> <li>• Measure the effects and determine and identify the unused capacities</li> <li>• Identify the necessary resources for the planned production and not in order to set out expenditure limits</li> <li>• Ensure the management, with the possibility of transformation of the organizational thinking regarding the fixed costs</li> <li>• Focus on the used capacity versus the unused capacity</li> <li>• Represent a possible solution for the budget process by increasing the real participation of the employees</li> <li>• Represent a tangible solution for short term planning of strategic objectives, as they focus on the basic processes of the work place for customer's satisfaction</li> <li>• Unify the efforts made by various functions, such as: processes re-engineering or processes reevaluation in a single effort directed towards the strategic objectives planned by the entity for a short or long term</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on workers and on departmental costs</li> <li>• Measure the effects, but do not determine and do not identify the unused capacities</li> <li>• Do not fulfill the purpose of a global budget, representing only analytical and control</li> <li>• They are based on a iterative negotiation process between the managers of responsibility centers and the senior management</li> <li>• Focus on the fixed costs versus variable costs</li> </ul>

### ***Stages of Activity-Based Budgeting***

As regards the stages of the activity-based budgeting, a series of great specialists in the field of management accounting expressed their opinions, such as: Shields, Hixon, Horngren, Kaplan and Cooper, Cokins. In order to fulfill the sales and production objectives, ABB assesses the volume of activities, taking into account the activity inductors, resources and their sizing. Practically, this system is an instrument of simulation at a global level, regarding the assignment or reassignment of resources necessary for performing activities and obtaining production.

According to the specialists' opinion, the stages of the activity-based budgeting are the following:

1. Estimation of key-factors of the budget (estimations regarding the total value of the quantities of products obtained and the sales to customers);
2. Establishment of the organizational activities (elaboration and execution of the activity-based budget);
3. Determination of the necessary resources (quantity and type) in order to perform the organizational activities;
4. Identification of the total of necessary resources in order to satisfy the demands;
5. Determination of the capacities at the level of activities and at the level of resources.

### ***Implementation of activity-based budgeting at Lupeni Mining Exploitation***

According to the data collected by the ABC method at the level of the entity, two main processes were identified: the production process and the administrative process. Each of them is structured on corresponding activities, according to table 3. The production process comprises three main processes (which may be identified in the main cost centers: CC2, CC3 and CC4) and seven secondary processes (which may be identified in the secondary cost centers). A regrouping of the secondary processes was made within the main processes. The administrative process consists of two main processes and pertaining activities.

Going through the above-mentioned stages, the total value of the products quantities obtained and the sales to customers of 44,603 tons of coal were estimated. The organizational activities, necessary for the elaboration and execution of the Activity-Based Budgeting were established, in accordance with table 4.



Table 3. Structuring processes on activities

Production process	Main processes (grouped on activities centers)	Main activities	Secondary processes (grouped on activities centers)	Secondary activities
	1. Sector 2 – Production	Hewing – caving bed 2 Coal preparation Mine tailing preparation Mining maintenance Transport flow Electricians, locksmiths Foremen, CFL	1.1. Sector 5 – Underground transport	Flow service (13 conveyers + 6 silos holes) Operation and maintenance of batching devices Mechanics of the water evacuation shaft LDM maintenance and repairs Electricians for skip shaft Maintenance of silos holes Signalmen for shaft CGI mining maintenance Conveyers mining maintenance Foremen, CFL Sorting (conveyers flow) Transport and storage - ropeway station Wood warehouse, carpentry shop
			1.2. Surface Transport Sector	
	2. Sector 3 – Production	Hewing – caving bed 3 Mine tailing preparation Mining maintenance Transport flow Electricians, locksmiths Foremen, CFL	2.1. Sector 6 – Underground electrical mechanic	Mechanics, locksmiths – maintenance, examination, repairs – extraction installations Water and air networks - mounting, dismantling, examination, repairs Mechanical machinery maintenance, repairs Maintenance, examination - electrical installations and equipment Firedamp detection station, telephony, dispatching Maintenance and cleaning – pumps basin Recovery of mechanical installations and equipment
			2.2. Sector 6 – Surface electrical mechanic	

				Foremen, CFL Room for safety lamps, manometers Telephone exchange Firedamp detection station Electricians, locksmiths serving the compressors' fans, Degasification Machine shop Electric shop Thermal power station Mechanics – surface extraction equipment Management Archive Foremen, CFL
	3. Sector 4 – Production	Complex mechanized longwall Mounting, dismantling, mechanized service Hewing – caving bed 4 Mine tailing preparation Mining maintenance Transport flow Electricians, locksmiths Foremen, CFL	3.1. Sector 7 – Underground ventilation  3.2. Sector 7 – Surface ventilation  4. Administrative personnel	CAMS specialists (gas measurement) Artificer – explosive warehouse Underground artificer Drillings Mud silting/Degasification Maintenance/Construction s. Ventilation Foremen, CFL Surveyor helps Mud silting Laboratory Dispatchers Data operators Administrative personnel Accounting records Calculation of costs offsetting Accounting data centralization Payroll, employment and personnel records Calculation of the performance indicators Fiscal records
Administrative process	1. Financial and accounting department	Financial and accounting records	1. Financial records	



	2. Taxes and duties compartment	Financial and fiscal records	2. Fiscal records	
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The entire process, named Activity-Based Budgeting (ABB) aims to determine a complete cost, as relevant as possible, by observing the causality connections between products/services and resources consumptions of the activities. Based on an integrated organization, the budgeting represents that work category which is executed within the business entity by the staff of the technical department, production and work design, organization and planning departments.

By ordering the activities and emphasizing directly the connections existing between them and the involved resources, respectively the demands of the customers, a correct management and their harmonizing are carried out within the above-mentioned business entity. Therefore, we consider that we found the answer to the second question analyzed in this study. Together with the ABC/ABM system, the activity-based budgeting is a management technique which establishes a solid basis for the financial planning and budget reporting.

Table 4. Organizational activities

	Main processes	Main activities	Type of expense and specific cost inductor
Production process	Production 1 (CC2)	Hewing – caving bed 2 Preparation of coal, mine tailings Mining maintenance Transport flow	Consumable expense <i>Inductor (number of consumer tickets)</i> Electrical energy expense <i>Cost inductor (consumption of kilowatts hour)</i>
	Production 2 (CC3)	Hewing – caving bed 3 Preparation of mine tailings Mining maintenance Transport flow	Depreciation expense <i>Cost inductor (economic lifetime)</i> Repair expense <i>Cost inductor (number of repairs)</i> Third party services expense <i>Cost inductor (number of third party invoices)</i>
	Production 3 (CC4)	Complex mechanized longwall Mounting, dismantling, mechanized service Coal face – caving bed 4 Preparation of mine tailings Mining maintenance Transport flow	Transport expense <i>Cost inductor (number of trips/shift)</i>
	Ad	Main processes	Main activities

	Financial and accounting records	Financial and accounting records	Accounting records <i>Cost inductor (number of pages of accounting ledger)</i> Calculation of costs offsetting <i>Cost inductor (number of pre-calculations)</i> Accounting data centralizations <i>Cost inductor (number of master tables)</i> Payroll <i>Cost inductor (number of hours worked)</i> Employment and personnel records <i>Cost inductor (number of employees)</i> Calculation of the performance indicators <i>Cost inductor (number of scorecards)</i>
	Financial and fiscal records	Fiscal records	Fiscal statements elaboration <i>Cost inductor (number of fiscal statements)</i>

For efficiently planning and setting out a budget, an Activity-Based Budgeting approach delivers (table 5 and table 6) that standard of the real operation costs of an efficient entity with added value.

Table 5. Production Activities-Based Budgeting

Activities	Total activity cost	Cost inductor	Cost/Cost inductor (3=1/2)	Demand	Demand cost (5=3*4)	Differences (6=1-5)
0	1	2	3	4	5	6
Hewing – caving bed	3705.00	24.00	154.375	25.09	3874.00	-169.00
Coal preparation, mine tailing	3549.25	2150.00	1.650	2206.29	3640.38	-91.13
Mining maintenance	1627482.87	1785123.24	0.911	1806278.80	1645519.99	-18037.12
Transport flow	410.00	60.00	6.833	59.27	405.00	5.00
Total	1635147.12	1653439.37				-18292.25

Table 6. Administrative Activities-Based Budgeting

Activities	Total activity cost	Cost inductor	Cost/Cost inductor (3=1/2)	Demand	Demand cost (5=3*4)	Differences (6=1-5)
0	1	2	3	4	5	6
Accounting records	274404.44	166029.38	1.65	165912.39	273755.45	648.99
Calculation of costs offsetting	295355.20	297491.30	0.99	306556.86	303491.30	- 8156.10
Accounting data centralization	108600.34	11	9872.75	11.24	110960.64	-2360.30
Payroll	3310338.00	247520	13.37	229378.16	3066786.00	243552.00
Employment and pers. records	4900.45	117	41.88	93.63	3921.65	978.80
Calculation of performance indicators	250806.78	3348	74.91	3481.69	260813.84	-10007.06
Fiscal records elaboration	144172.28	18	8009.57	18,11	145123,28	-951
Total	4388577.49	4164852.16				223725.33

Taking into account the chosen cost inductors, the situation of expenses assigned on activities specific to the two main processes is the following (table 7 and table 8):

Table 7. Budgeting based on activities specific to the production process

Explanations Planned expenses assigned on activities	Planned expenses assigned for the production process			
	CC2	CC3	CC4	Total
<b><i>Hewing – caving bed</i></b>				
- Various materials expense	1235	926.25	1543.75	3705
<b><i>Preparation of coal, mine tailings</i></b>				
- Fuel expenses	865.81	775.57	1733.62	3375
- Antidote fluid expense	38.71	38.71	96.83	174.25
<b><i>Mining maintenance</i></b>				
- Spare parts expense	3956.31	6330.11	8703.93	18990.35
- Electrical energy expense	254943.46	276229.19	363627.5	894800.15
- Thermal energy expense	8932.87	7401.52	11995.61	28330
- Depreciation expense	19060.51	17659.62	37961.99	74682.12
- Machinery repair expense	13062.85	6531.42	10885.73	30480
- Third party services expense	156207.75	111576.97	312415.53	580200.25
<b><i>Transport flow</i></b>				
- Materials transportation expense	136.67	136.67	136.66	410
<b>Total</b>	<b>458439.94</b>	<b>427606.03</b>	<b>749101.15</b>	<b>1635147.12</b>

Table 8. Budgeting based on activities specific to the administrative process

Explanations Planned expenses assigned on activities	Planned expenses assigned on cost centers			
	CC2	CC3	CC4	Total
<b><i>Financial and accounting records</i></b>				
- Payroll expenses	568230	577190.46	1040079.54	2185500
- Payroll accessories expenses	292381	297097	535360	1124838
- Depreciation of general-interest fixed assets	45540.48	52187.78	56072.19	153800.45
- Insurance premiums	246.535	246.535	493.07	986.14
- Materials for maintenance and cleaning buildings expenses	49.33	49.33	49.34	148
- Electricity for lighting and driving force for administrative needs	1636.69	1702.60	2110.71	5450
- Postage and telecommunications expenses	177.57	266.34	266.34	710.25
- Travel in country expenses	700.11	700.11	1400.23	2800.45
- Security and civil protection expenses	39491.02	39491.02	29618.30	108600.34
- Coal allotments	10851.47	10851.47	10851.46	32554.40
- Price balance of electricity	87600.27	87600.27	87600.27	262800.80
- Meals expenses	174176.53	34215.64	17107.83	225500
- Protection equipment expenses	19547.01	3839.85	1919.92	25306.78
- Employees training	1465.94	136.11	3298.40	4900.45
- Medical practices expenses	9157.41	8546.91	11395.93	29100.25

Explanations Planned expenses assigned on activities	Planned expenses assigned on cost centers			
	CC2	CC3	CC4	Total
- transport to and from work	56231.53	11046.24	5523.13	72800.90
- Support allowance	500	0	1000	1500
- Death allowance	0	0	7.108	7108
<b>Fiscal records</b>				
- Taxes for author certificates issuance	3150.25	0	3150.25	6300.50
- Stamp duty expenses	0	0	63	63
- Operating duties	40980	54640	40980	136600
- Bank commissions	483.512	241.756	483.512	1208.78
<b>Total</b>	<b>1352596.65</b>	<b>1180049.42</b>	<b>1855931.42</b>	<b>4388577.49</b>

### Results and Discussions

From the data centralized above, the situation of the activity-planned costs at the entity level results as follows: CC2 = 1811036.59 lei, CC3 = 1607655.45 lei, CC4 = 2605032.57 lei.

As it may be noted, the Activity-Based Budgeting within Lupeni Mining Exploitation was successfully carried out as thus the answer to the first question asked in the beginning of our study was found. According to the recorded situation, we can conclude the following:

- in the production activities, the differences recorded between the total planned cost and the necessary cost (demand) are 18292.25 lei, which translates as follows: savings for the items *hewing – caving bed, coal preparation, mine tailing and mining maintenance*, and cost excess for the item *transport flow*.

- in the administrative activities, the differences recorded between the total planned cost and the necessary cost (demand) are 223725.33 lei, which translates as follows: cost excess for the item *accounting records, payroll and employment and personnel records*, and savings at the items *calculation of costs offsetting, accounting data centralization, calculation of the performance indicators, fiscal statements elaboration*.

The Activity-Based Budgeting approach supplies real data regarding the number of cost reductions determined by the cost improvement initiatives, thus offering to accountants another perspective regarding the costs. Knowing this information, the Activity-Based Budgeting may contribute to the increasing of the business entities performances within the extractive mining industry and, practically, the third question asked for this study was answered.

### Conclusions

The Activity-Based Budgeting should influence the employees' behavior, by financial or non-financial measures, thus exceeding the functional limits arising from the division of the entity on functional bases, and attracting the attention to the value areas resulting from the coherence of the operations, regardless of functions.

One of the most evident advantages of the ABB implementation reflects in the way to calculate the cost and costs analysis. In the case of each process, the accurate determination of planned costs up to the level of each activity can be noted, helping to establish the customers' demands and the work volume necessary for satisfying their demands at internal level within the entity, but also to establish the differences at the end of the management period by comparing the effective costs with the planned costs.

The comparison between the necessary and available resources, as well as the determination of the usage level shall take place at a functional level (departments) and at process level, thus offering a management with a clear perspective on the deficient areas. Thus, the necessary resources for each activity may be determined and the excess can be used or redirected towards the deficient activities. Each process may be assigned a so-called "process manager" who can ensure the success of the management of his activities and who can constitute the guarantor of an efficient management.

With a successfully implemented Activity-Based Budgeting system, the management accountants can use the obtained information and data for analyzing the trends, for estimating and modeling according to scenarios "What if...?". By estimating the quantities and volumes on a defined management period, information regarding all cost objects, cost inductors, necessary amounts and the level of resources costs can be obtained. Practically, the Activity-Based Budgeting is a flexible budgeting, using more factors than the estimated production units or work volume, offering a clearer forecast regarding the current costs and the resources necessary for the entity.

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