PROPOSAL OF THE COST MINIMIZATION PROCEDURE IN THE INVENTORY CONTROL

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Abstract
  Contemporary material flow management is evaluated by criteria with impact on the cost savings at the local level of each department. From a global point of view of the whole enterprise there is formed an antagonistic relationship between departments. It is not possible to assess the impact of the results of one department on the results of the whole enterprise. The paper opens a new possibility in solution of business costs savings on a global scale.

Keywords: Inventory, inventory control, cost, global cost inventory control, lean production.

Introduction
  The individual departments of the enterprise create and provide interlinked chain of the processes, whose activities are interrelated. In today's practice, the management at the local levels in the individual departments is predominant. Goals to meet the individual evaluation criteria are set out for the individual indicators separately, regardless of the impact on other indicators. Cost savings benefits in one department may cause costs increases in the other departments. As a result, there are increased overall production costs and a lot of logistic problems for the company.

1. The industry environmental transformation:
  For integration in the management of the entire processes flow of the inventory control is necessary to integrate monitored indicators of the individual departments and give them a common ground. The transition to the costs management from the level of the whole company will ensure the costs measurement in the whole management process and impact of their change on the individual departments. This will permit to effectively decide and choose the optimal variant of the management.

1.1 Evaluation criteria in the global inventory control

The most important objective of the enterprise's business activity is a profit achievement. Making a profit or a loss reflects an economic result of the company.

Economic result

It is the most important economic indicator. The indicator may be expressed in money (quantitative indicator) and also it reflects the quality of the business activity (qualitative indicator). An economic result is also a global indicator because it reflects the level of all operations of the company (production, supply, marketing, administrative etc.). It reflects the impact of all the changes incurred during the performance of the manufacturing process. It is expressed as:

$$P = Y - TC \qquad \textbf{(1)}$$

P – profit – business result
Y – yield
TC – total cost

$Y > C$, the company achieves a profit
$Y < C$, the company achieves a loss

A value expression of the input and output relationship demonstrates the effectiveness of the organization management. Consumption of the production factors - labor, raw materials, energy, time, etc. can be counted. The monetary expression of the business resources consumption required to implement business objectives are the costs. The costs reflect a monetary valuation of the consumption of the factors of production required for the production implementation for specified period of time. Cost functions always express the relationship between cost and volume (inventory).

Yield

The value of the yield is expressed by the value of the order - a business case, which forms the volume of pricing products.

The total cost of the inventory control

For a range of models solution at the inventory control area, we will consider only the costs directly related to their activity. Based on defined costs of the inventory control we will express the total costs of the inventory control (TC_{IC}) by additive function according to the formula:

$$TC_{IC} = \sum_{i}^{n} N_i \qquad \text{where i} = 1,2,....n \qquad \textbf{(2)}$$

Ni – the individual costs in the inventory control as the inventory holding costs, Purchase Price Variance (PPV), the costs of acquisition of stock, transport, storage, etc. If we consider other administration and production costs for a wide range of items as a constant then we will not express an economic result (profit), but economic value added of inventory control (EVA) for producing a profit. Impact of the changes in TCIC on EVA - will present the indicator of the efficiency individual departments of the inventory control on the overall economic result of the company.

Economic value added

The changes in the inventory control evaluation criteria at the local levels of the individual departments can be lost in the entire context. To increase a sensitivity of the changes contribution and the possibility of their quantification, the proportion of the economic added value creation will be quantified. Value added (EVA - Economic Value Added) consisting of the difference between operating profit and cost is expressed by following formula:

$$EVA = Y - TC_{IC} \qquad (3)$$

Y – yield,

TC_{IC} –Inventory control total costs

The added value of the product is created when the properties or shape of the product are changed. Based on this "definition", an entire logistics is wasted because logistics does not alter the shape or characteristics of the product. The inventory control in the company mostly does not add a value to the product but sees that the rate of added value is the highest. The inventory control contributes to this by reducing waste.

A customer determines the required added value. For the inventory control, we can define the company as a customer, for which the cost reduction constitutes the added value. The company hopes that the inventory control met their requirements according to the customer's supply dates, quality standards etc. and even better. This is an added value which the inventory control brings for the company.

Economic value added margin

To make the control more effective, we solve the margin of value added (EVA) by measures to reduce costs in order to increase the yield (Fig. 1). EVA quantification reflects the reached contribution made to the total production costs during the reporting period. It is expressed as follows:

$$\Delta EVA_i = TC_{ICi} - TC_{ICcalc} \qquad \text{for a business case i = 1,...n} \quad (4)$$

TC_{ICcalk} – calculated total costs of the inventory control,

CVN_{RZi} – achieved total costs of the inventory control in the particular business case.
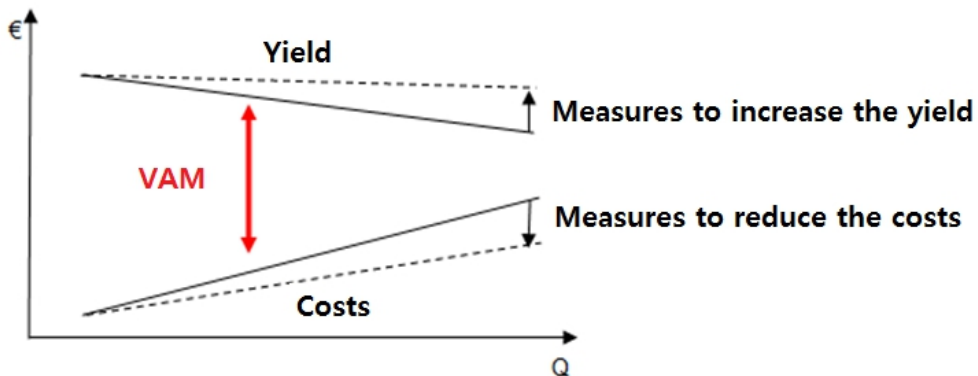

Fig. 1 Innovative technologies and concepts for intelligent mining mine of the future

1.2 Cost model of the control for decision-making level

To achieve the inventory control from the level of the entire enterprise, it is necessary to see the whole process of the material flow management as a single chain of the interlinked components. The individual links of the chain consist of the inventory and production control departments. Their performance is united by transformation their various appraising indicators to the costs that can be globally evaluated and compared.

In practice, the inventory control models do not take into account the impact of the inventory control on the creation of the extra costs of production, such as creation of scrap, surplus labor, rejects, claims etc. The enterprise must often take into account many cases of the acquisition leading to the increase in costs. According to the availability of information, it is suitable to include them in the model. The model contains four types of calculations and data:

1.   Basic data on the material and its categorization obtained from the enterprise information system as: name, ACB, XYZ analysis, supplier, standard cost, the current stock level, material consumption.

2.   Calculator of the inventory level - based on the supply conditions such as supply time, purchase quantity, ABC analysis calculates required number of the ordering signals, the average stock level and safety stock for a given set of supply terms.

3.   Cost model quantifies the individual types of costs in the area of inventory control and their impact on the costs of production.

4.   Evaluation of the total production costs and value added according to the procurement strategy.

Cost model (Tab. 1) presents a solution taken into account all variations of the acquisition of stock with the impact on total costs. In the

model shown in the part Plan is evaluated the control of the total costs according to the average state of the business cases implementation in the previous period.

Total production costs are divided into:

- the total costs of inventory control (TCIC) - to quantify the impact of supply conditions, such as: supplier, the purchase price for the order quantity, lead time,
- the total costs of production (TCP) - to quantify the impact of supply conditions on the production process, such as: the costs of scrap, overtime, additional remodeling, express transport, etc.

The changes in supply conditions and their impact on the total production costs can be simulated in the model of the costs in the Variants. For better clarity, the changes are highlighted. The part Variant 1 of the model evaluates proposed changes in supply terms and their impact on the change in total costs against planned. The result is an expression of a range of value added expressed by beneficial change to the planned value added (Tab. 1).

Tab. 1 Inventory control cost model

Plan

Material	Supplier	Standard Price	Ordering signals	Quantity	Lead time	Actual stock level	Purchase Price	Material	Ordering	Transport	PPV	Holding	Carrying	Scrap	Claim	First Past Yield	Overproduction	Fill Rate	Distribution	Total cost	EVA
								Inventory costs for:						**Production costs**							
M1	I	0,26 €	2	2000	21	153 €	0,25 €	398	20	30	-13	348	4	81	200	50	50			769 €	
M2	I	0,26 €	2	2000	21	542 €	0,25 €	403	20	30	-18	361	5	17						415 €	
M3	II	0,49 €	2	2000	21	904 €	0,49 €	758	20	30	0	664	8	71	200	50	50			1 094 €	
M4	I	0,24 €	2	2000	21	170 €	0,24 €	366	20	30	0	325	4	19						398 €	
M5	I	0,32 €	1	6000	21	1 078 €	0,32 €	499	20	30	0	1 346	17	22						1 435 €	
M6	III	0,83 €	3	2000	42	2 650 €	0,83 €	1 278	20	30	0	1 462	18	55						1 585 €	
M7	IV	0,11 €	2	6000	21	172 €	0,13 €	171	20	30	29	776	10	4						868 €	
M8	V	1,08 €	2	3000	28	1 302 €	1,09 €	1 664	20	30	7	2 531	32	70						2 690 €	
M9	VI	4,40 €	2	2000	21	8 774 €	4,35 €	6 776	20	30	-77	5 627	70	737	200	100	200			6 907 €	
M10	VII	0,21 €	2	10000	56	1 156 €	0,21 €	316	20	30	0	2 194	27	13						2 285 €	
Yield		**38 500 €**				**16 900 €**		12 630	200	300	-72	15 635	195	1 090	600	200	300	0	0	31 077 €	7 423 €

Variant 1

Material	Supplier	Standard Price	Ordering signals	Quantity	Lead time	Actual stock level	Purchase Price	Material	Ordering	Transport	PPV	Holding	Carrying	Scrap	Claim	First Past Yield	Overproduction	Fill Rate	Distribution	Total cost	EVA
M1	I	0,26 €	2	2000	21	153 €	0,25 €	398	20	30	-13	348	4	81	200	50	50			769 €	
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M6	III	0,83 €	3	2000	42	2 650 €	0,83 €	1278	20	30	0	1462	18	55						1 585 €	
M7	V	0,11 €	2	5000	28	172 €	0,10 €	171	20	30	-17	534	7	11	0					584 €	
M8	V	1,08 €	2	2000	21	1 302 €	1,09 €	1664	20	30	7	1493	19	70						1 639 €	
M9	VIII	4,40 €	2	1500	14	8 774 €	4,42 €	6776	40	60	31	5344	67	3						5 545 €	
M10	VII	0,21 €	2	10000	56	1 156 €	0,21 €	316	20	30	0	2194	27	13						2 285 €	
Yield		**38 500 €**				**16 900 €**		12 630	220	330	-11	14 072	176	364	400	100	100	0	0	28 380 €	10 120 €

Δ	EVA		0	20	30	62	-1 563	-20	-726	-200	-100	-200	0	0	-2 697	2 697 €

Table content: *Variant 1 compares the impact of change in supply conditions on the planned TC. M7 material- change of the supplier and decrease in purchase amount has a positive impact on the average amount*

of the inventory, price reduction = lower PPV but increase in scrap by 1%, reduction in the sum of TC. M9 material: reduction of purchase quantity and supply time reduces storage costs, but increases the acquisition costs. A higher price increases PPV, but better quality material will reduce the costs of production. The final TC is lower. Variant 1 provides an increase in the value added by € 2,697.

Comparison of the current state with the possible variants of the acquisition strategy will allow the selection of the most effective strategy of the management under the impact on the added value. A choice of acquisition strategy is chosen according to the highest value added.

Conclusion

A good control must have view from above, watch the whole system from top in order to keep the main objective of the action - making profit. A transition to the inventory control will ensure from the whole enterprise the costs measurement in the entire management process. An effectiveness of the local department's decisions is united through a single global evaluation criterion of the management what is the solution for win – win - the path of mutual satisfaction. This will eliminate many problems of the management and achieves the true global cost reduction.

Acknowledgment

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