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VARIANCE ANALYSIS IN MANUFACTURING COMPANIES

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Abstract:

In dynamic and constantly changing contemporary business conditions, it is of key importance to dispose of adequate and relevant information on movements in the manufacturing process and to make adequate business decisions. Traditional accounting is not able to respond to all challenges, and thus it is necessary to enable better understanding of the manufaturing processes and the effects of various factors on the final outcomes and product costs. Several different models of cost accounting have been proposed with certain advantages and flaws, depending on the complexity of production and management requirements. Variance analysis is a tool that financial controllers and corporate financial managers use to interpret variations in operating results compared to the result envisaged by the budget or budget revision throughout the year.

The aim of this paper is to analyse the effects of variance analysis in the manufacturing company as a result of its good managerial accounting. The subject of this paper is one company, and its course from the budget as the basis for implementation of variance analysis, to realization and explanation of discrepancies between these two scenarios.

Key words:

variance analysis, budget, planning, management, business results.

1. INTRODUCTION

It is hard to imagine business of a contemporary, globally - oriented company without the follow-up and necessary information on the manufacturing process. Apart from being correct and true, information also needs to be provided in the right place and at the right time. In the contemporary business world, belated piece of information has no value and it is almost valueless. Variable analysis is one of the tools used by the managers to become conversant with the current business situation and provide favourable operating results in the future. More precisely, this paper places an emphasis on the variance analysis, which refers to examining the role, significance and possibility of using it in a manufacturing company.

The role of the analysis of variance is gaining more and more importance as managers want to know how corrections/ changes of specific input in manufacturing could affect operating results. Therefore, the analysis of variance could be defined as a tool used to detect deviations of the accomplished operating results compared to the expected results in the budget, which also represents the main goal of this research. Furthermore, it is used by a company's management to be able to clearly perceive all aspects of doing business,

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to react to potential problems in due time, and to eliminate these problems along with their associates with the aim of maximizing results and improving the company's productivity. The analysis of variance is done each month during 'the closing period' and it enables a company's management to analyse all anomalies in the company, to prepare action plans for the following periods in order to fix the anomalies (here we refer to negative anomalies, as positive anomalies imply the improvement of the results) and to avoid potential negative effects on the company's results. The analysis of variance proceeds from a company's budget, which is used to explain the current result through various variances (Hillier, 2006). As we have already mentioned, a month, a period or a whole year can be compared, having in mind that the analysis of variance at the end of the year cannot be used as a correction tool, but only as a final explanation for the deviation from the planned result. On the other hand, the analysis of variance for a month, and especially the analysis of variance for a period, represent a significant tool for the management by which they can take corrective measures in order to minimize the deviation from the planned result. The analysis of variance can be shown by table and graphs, depending on the level of details to be seen and the level of observation of the current results.

The role of management accounting in a company is to help the management achieve optimal financial results, with reference to enhancing the company's productivity (Bierman, 1987; Gowthorpe, 2008; Petrovic, 2011). Therefore, the quality of management accountant has an immense impact on the prompt action of management in order to improve or mitigate the effects of input change in the production process (Marjanovic & Milojevic, 2011). The division of costs into fixed and variable component and evaluation of their influence on cost price represent a challenge of each productionoriented and market-oriented company. All these actions are conducted with the aim of creating the budget which will be the business target (Barjatarovic et al., 2014). The effects of change of certain factors on the budget will be presented in the example of a manufacturing company. We will strive to describe all steps and phases during the observation and correction of the budget.

2. RESULTS AND DISCUSSION

Budget represent a company's plan for the following period. As such, it has to be created with maximum attention, taking into consideration all aspects that may affects operating result (Milojevic & Miletic, 2014). All company's departments which support a company from the aspect of supply, sales, human resources etc, both manufacturing and organizational, should participate in the budget creation. Most often, the basis of the budget creation is sales plan and sales mix created by the sales sector. Based on the sales plan, other company sectors create the parts of budget related to their responsibilities.

As regard material costs, and based on the production component, the amount of the material necessary for production is calculated in accordance with the sales demands. An important aspect of material costs are material prices.

Table 1. Sales and sales mix

Sales	Jan	Feb	Mar	Apr	Maj	jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
Product A	5,700	5,500	6,700	6,100	6,100	6,700	7,000	3,350	6,700	6,700	6,100	3,950	70,600
Product B	4,845	4,675	5,695	5,185	5,185	5,695	5,950	2,848	5,695	5,695	5,185	3,358	60,010
Overall	10,545	10,175	12,395	11,285	11,285	12,395	12,950	6,198	12,395	12,395	11,285	7,308	130,610

Table 2. Main material necessary for the	production of two	products
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M	ain material in kg.	Jan	Feb	Mar	Apr	Maj	jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
	Product A	17,100	16,500	20,100	18,300	18,300	20,100	21,000	10,050	20,100	20,100	18,300	11,850	211,800
	Product B	12,113	11,688	14,238	12,963	12,963	14,238	14,875	7,119	14,238	14,238	12,963	8,394	150,025
	Overal	20 213	20 100	2/ 220	31 263	21 262	2/ 220	35 875	17 169	3/1 338	3/1 338	31 263	20 244	361 825
		23,213	20,100	34,330	31,203	51,205	34,330	33,073	17,105	J 4 ,JJ0	J 4 , JJ0	51,205	20,244	301,023
		23,213	20,100	34,338	51,205	31,203	34,338	33,873	17,105	34,330	34,330	51,205	20,244	301,023
M	lain material in RSD.	Jan	Feb	Mar	Apr	Maj	jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
M	lain material in RSD. Product A	Jan 10000	Feb 10000	Mar 10000	Apr 10000	Maj 10000	jun 10000	Jul 10000	Avg 10000	Sept 10000	Okt 10000	Nov 10000	Dec 10000	Year 10000
М	lain material in RSD. Product A Product Bl	Jan 10000 12000	Feb 10000 12000	Mar 10000 12000	Apr 10000 12000	Maj 10000 12000	jun 10000 12000	Jul 10000 12000	Avg 10000 12000	Sept 10000 12000	Okt 10000 12000	Nov 10000 12000	Dec 10000 12000	Year 10000 12000

Table 3. Estimate of direct hours based on production by product unit

Product A	Jan	Feb	Mar	Apr	Maj	jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
Amount	5,700	5,500	6,700	6,100	6,100	6,700	7,000	3,350	6,700	6,700	6,100	3,950	70,600
Production hour	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of hours	17,100	16,500	20,100	18,300	18,300	20,100	21,000	10,050	20,100	20,100	18,300	11,850	211,800
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Product B	Jan	Feb	Mar	Apr	Maj	Jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
Amount	4,845	4,675	5,695	5,185	5,185	5,695	5,950	2,848	5,695	5,695	5,185	3,358	60,010
Production hour	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Number of hours	18,169	17,531	21,356	19,444	19,444	21,356	22,313	10,678	21,356	21,356	19,444	12,591	225,038
									. .	0 1.			Maria
Overal	Jan	Feb	Ivlar	Apr	IVIaj	Jun	Jul	Avg	Sept	OKt	Nov	Dec	rear
Amount	t 10,545	10,175	12,395	11,285	11,285	12,395	12,950	6,198	12,395	12,395	11,285	7,308	130,610
Production hou	r 35,269	34,031	41,456	37,744	37,744	41,456	43,313	20,728	41,456	41,456	37,744	24,441	436,838
Amount Production hou	r 3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34

Table 4. The necessary number of planned employees in the budget

J	an	Feb	Mar	Apr	Maj	jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
Theoretical days	22	20	22	22	21	22	23	21	22	22	21	23	261
Working days	19	18	22	20	20	22	23	11	22	22	20	13	232
Number of direct workers	252	252	251	252	252	251	251	251	251	251	252	251	251
Number of indirect workers	76	76	75	75	75	75	75	75	75	75	75	75	75
Number of administrative workers	25	25	25	25	25	25	25	25	25	25	25	25	25

The department/ sector of procurement which gives its predictions about the prices of direct material is in charge of this issue. Usually, they start with the current prices, based on which an estimation is given regarding the efficiency of procurement using better negotiating aspects and trends in commodities in the world market. This is how we reach planned cost of direct material. The table below shows direct material consumption in kg, as well as the prices of direct materials. In order to simplify the table, we have examined the overall material necessary for the production of two finished products.

The following step is the time of production which is necessary in order to count the number of hours, *i.e.* the number of direct workers needed for production in order to satisfy the planned level of sales. The table below shows the estimate of the number of direct hours based on the production time by product unit. In our example, production time for product A and product B is 3 hours and 3.75 hours, respectively.

Based on the number of hours, the department of work analysis conducts calculation of the number of direct workers, as well as the number of indirect workers. The number of administrative workers is mostly based on the current situation, but also on the needs regarding new employments or reorganization plan which implies redundancy notices due to a decrease in the company's activities. Moreover, the number of working days needed for a certain level of production is also taken into consideration.

In continuation of this process, HR department gives an estimation of wage policy, starting from the current income level and including potential corrections planned for the following year. Along with this process, the manufacturing level of a company gives their estimations of transformation costs, regarding the level of internal write-offs, consumption of indirect material and maintenance material, as well as costs of manufacturing services.

Technical service gives an estimation of the usage of electrical energy based on the production and estimated costs of fuels, as well as an estimate of the costs of fuels in the future in cooperation with the procurement sector.

The aforementioned data are forwarded to Finance/Controoling department which systemizes them and creates the budget. Controlling department also does an estimation of amortization costs, based on the activated main means and

Table 5. Defining cost price in manufacturing company

RSD	Jan	Feb	Mar	Apr	Maj	jun	Jul	Avg	Sept	Okt	Nov	Dec	Year
Production volume	10,545	10,175	12,395	11,285	11,285	12,395	12,950	6,198	12,395	12,395	11,285	7,308	130,610
Direct hours	35,269	34,031	41,456	37,744	37,744	41,456	43,313	20,728	41,456	41,456	37,744	24,441	436,838
Main materia	E7 000 000	EE 000 000	67 000 000	61 000 000	61 000 000	67 000 000	70,000,000	22 500 000	67 000 000	67 000 000	61 000 000	20 500 000	706 000 000
Product A	57,000,000	55,000,000	67,000,000	61,000,000	61,000,000	67,000,000	70,000,000	33,300,000	67,000,000	67,000,000	61,000,000	39,300,000	700,000,000
Product B	58,140,000	56,100,000	68,340,000	62,220,000	62,220,000	68,340,000	71,400,000	34,170,000	68,340,000	68,340,000	62,220,000	40,290,000	720,120,000
Overall	115,140,000	111,100,000	135,340,000	123,220,000	123,220,000	135,340,000	141,400,000	67,670,000	135,340,000	135,340,000	123,220,000	79,790,000	1,426,120,000
Direct work	14,107,500	13,612,500	16,582,500	15,097,500	15,097,500	16,582,500	17,325,000	8,291,250	16,582,500	16,582,500	15,097,500	9,776,250	174,735,000
Indirect work	4,232,250	4,083,750	4,974,750	4,529,250	4,529,250	4,974,750	5,197,500	2,487,375	4,974,750	4,974,750	4,529,250	2,932,875	52,420,500
Administration	1,511,248	1,512,500	1,507,500	1,509,750	1,509,750	1,507,500	1,506,522	1,507,500	1,507,500	1,507,500	1,509,750	1,504,038	18,101,058
1													
Internal write-offs	5,757,000	5,555,000	6,767,000	6,161,000	6,161,000	6,767,000	7,070,000	3,383,500	6,767,000	6,767,000	6,161,000	3,989,500	71,306,000
ndirect materia	8,059,800	7,777,000	9,473,800	8,625,400	8,625,400	9,473,800	9,898,000	4,736,900	9,473,800	9,473,800	8,625,400	5,585,300	99,828,400
Services	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	216,000,000
Energy	40,299,000	38,885,000	47,369,000	30,805,000	30,805,000	33,835,000	35,350,000	16,917,500	33,835,000	47,369,000	43,127,000	27,926,500	426,523,000
Other costs	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	300,000,000
Load costs	102 859 298	100 813 250	113 092 050	94,630,400	94 630 400	99 558 050	102 022 022	72 032 775	99 558 050	113 092 050	106 952 400	84 938 213	1 184 178 958
Transformation costs	116 966 799	114 425 750	129 674 550	109 727 900	109 727 900	116 140 550	110 247 022	90 224 025	116 140 550	129 674 550	122 049 900	04,000,210	1 259 012 059
	110,500,758	114,423,730	125,074,550	105,727,500	105,727,500	110,140,550	115,547,022	80,324,023	110,140,550	129,074,330	122,049,900	54,714,403	1,338,913,938
Amortization	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	142,612,000
Overall transformation costs	128,851,131	126,310,083	141,558,883	121,612,233	121,612,233	128,024,883	131,231,355	92,208,358	128,024,883	141,558,883	133,934,233	106,598,797	1,501,525,958
Production costs	243 991 131	237 410 083	276 898 883	244 832 233	244 832 233	263 364 883	272 631 355	159 878 358	263 364 883	276 898 883	257 154 233	186 388 797	2 927 645 958
rioduction costs	2-3,331,131	237,410,003	2,0,050,005	244,032,233	2-1,032,233	203,304,003	2,2,031,333	100,070,000	203,304,003	2,0,050,005	237,234,233	200,000,707	2,527,043,550

Table 6. An example of introducing the division of costs into fixed and variable component

RSD	Year	Var	Fiks	Var RSD	Fix RSD	Var RSD/h	Fix RSD/h
Production volume	130,610						
Direct hours	436,838						
Main material							
Product A	706,000,000						
Product B	720,120,000						
Overall	1,426,120,000	100%	_	1,426,120,000	-		
Direct work	174,735,000	100%		174,735,000	-	400	-
Indirect work	52,420,500	70%	30%	36,694,350	15,726,150	84	36
Administration	18,101,058		100%	-	18,101,058	-	41
						-	-
Internal write-offs	71,306,000	100%		71,306,000	-	163	-
Indirect material	99,828,400	85%	15%	84,854,140	14,974,260	194	34
Services	216,000,000		100%	-	216,000,000	-	494
Energy	426,523,000	50%	50%	213,261,500	213,261,500	488	488
Other costs	300,000,000		100%	-	300,000,000	-	687
Load costs	1.184.178.958			406.115.990	778.062.968	930	1.781
Transformation costs	1.358.913.958			580,850,990	778.062.968	1.330	1.781
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Amortization	142,612,000		100%	-	142,612,000	-	326
Overall transformation costs	1,501,525,958			580,850,990	920,674,968	1,330	2,108
Production costs	2,927,645,958			2,006,970,990	920,674,968		

the level of amortization for each specific means, as well as based on the estimation of future investment in the production process and amortization for the activated main means in the future. This is how we reach all relevant costs necessary for calculation of cost price of our products. In order to properly calculate cost price, we introduce the division of costs into variable, relatively fixed and fixed costs.

Based on the rate of fixity and variability, we are able to calculate the overall variable costs and overall fixed costs for the budget level of production and to define them according

Table 7. Defining cost price and selling price

				Product A	Product B
			Material	10,000	12,000
	Product A	Product B	Variable costs/ h	1,330	1,330
Material	10,000	12,000	Fixed costs/h	2,108	2,108
Variable costs/ h	1,330	1,330	Transformation costs/h	3,437	3,437
Fixed costs/h	2,108	2,108	Production hours	3	4
Transformation costs/h	3,437	3,437	Transformation costs	10,312	12,890
Production hours	3	4	Cost price	27,189	31,768
Transformation costs	10,312	12,890	Profit margin 10%	2,719	3,177
Cost price	27,189	31,768	Selling price	29,908	34,945

Table 8. The budget of a manufacturing company

DCD	Inc	E.L	14-11	A 100 10	b 4 - 1	t	L.J.	A	Cont	Olit	News	D	Veer
KSD	Jan	Feb	Iviar 42.205	Apr	iviaj	Jun	Jui	Avg	Sept	UKt	NOV	Dec	Tear
Production volume	10,545	10,175	12,395	11,285	11,285	12,395	12,950	6,198	12,395	12,395	11,285	7,308	130,610
Direct hours	35,269	34,031	41,456	37,744	37,744	41,456	43,313	20,728	41,456	41,456	37,744	24,441	436,838
Main materia	57 000 000	55,000,000	67 000 000	61 000 000	61 000 000	67 000 000	70,000,000	33 500 000	67 000 000	67 000 000	61 000 000	39 500 000	706 000 000
Product A	58 140 000	56 100 000	68 340 000	62,220,000	62,220,000	68 340 000	71,400,000	34 170 000	68 340 000	68 340 000	62,220,000	40,290,000	720 120 000
Product B	115 140,000	111 100,000	135 340,000	132,220,000	132,220,000	135 340,000	141 400,000	54,170,000	135,340,000	135,340,000	122,220,000	70,200,000	1 426 120,000
Overa	113,140,000	111,100,000	133,340,000	123,220,000	123,220,000	133,340,000	141,400,000	87,870,000	133,340,000	133,340,000	123,220,000	75,750,000	1,420,120,000
Direct work	14,107,500	13,612,500	16,582,500	15,097,500	15,097,500	16,582,500	17,325,000	8,291,250	16,582,500	16,582,500	15,097,500	9,776,250	174,735,000
Indirect work	4,232,250	4,083,750	4,974,750	4,529,250	4,529,250	4,974,750	5,197,500	2,487,375	4,974,750	4,974,750	4,529,250	2,932,875	52,420,500
Administration	1,511,248	1,512,500	1,507,500	1,509,750	1,509,750	1,507,500	1,506,522	1,507,500	1,507,500	1,507,500	1,509,750	1,504,038	18,101,058
Internal write-offs	5,757,000	5,555,000	6,767,000	6,161,000	6,161,000	6,767,000	7,070,000	3,383,500	6,767,000	6,767,000	6,161,000	3,989,500	71,306,000
Indirect materia	8,059,800	7,777,000	9,473,800	8,625,400	8,625,400	9,473,800	9,898,000	4,736,900	9,473,800	9,473,800	8,625,400	5,585,300	99,828,400
Services	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	216,000,000
Energy	40,299,000	38,885,000	47,369,000	30,805,000	30,805,000	33,835,000	35,350,000	16,917,500	33,835,000	47,369,000	43,127,000	27,926,500	426,523,000
Other costs	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	300,000,000
Load costs	102.050.200	100 012 250	112 002 050	04 630 400	04 620 400	00 550 050	102 022 022	72 022 775	00 550 050	112 002 050	100 052 100	04.020.242	1 104 170 050
Transformation costs	102,859,298	100,813,250	113,092,050	94,630,400	94,630,400	99,558,050	102,022,022	/2,032,//5	99,558,050	113,092,050	106,952,400	84,938,213	1,184,178,958
Transformation costs	116,966,798	114,425,750	129,674,550	109,727,900	109,727,900	116,140,550	119,347,022	80,324,025	116,140,550	129,674,550	122,049,900	94,714,463	1,358,913,958
Amortization	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	11,884,333	142,612,000
Overall transformation costs	128,851,131	126,310,083	141,558,883	121,612,233	121,612,233	128,024,883	131,231,355	92,208,358	128,024,883	141,558,883	133,934,233	106,598,797	1,501,525,958
Production costs	243,991,131	237,410,083	276,898,883	244,832,233	244,832,233	263,364,883	272,631,355	159,878,358	263,364,883	276,898,883	257,154,233	186,388,797	2,927,645,958
Sales													
Overa	260,004,818	250,881,842	305,619,698	278,250,770	278,250,770	305,619,698	319,304,163	152,809,849	305,619,698	305,619,698	278,250,770	180,178,777	3,220,410,554
Result	16 013 687	13 471 759	28 720 815	33 418 537	33 418 537	42 254 815	46 672 808	(7.068.509)	42 254 815	28 720 815	21 096 537	(6,210,019)	292 764 596
	10,013,007	13,471,733	20,720,015	55,410,557	33,410,337	-2,234,015		(7,000,000)	-12,234,013	20,720,015	22,000,007	(0,210,015)	232,704,330

Table 9. The example of corrected budget for current production volume

Absorption Budget

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		lanuar	Februar	Mort	Anril	Mai	luni	l. li	August	Contombor	Oktobar	Nevember	December	Veen
		Januar	rebluar	Wart .	April	Iviaj	Juli	Juli	Avgusi	Septembar	OKIODAI	Novembar	Decembar	rear
Budget hours		35,269 H	34,031 H	41,456 H	37,744 H	37,744 H	41,456 H	43,313 H	20,728 H	41,456 H	41,456 H	37,744 H	24,441 H	436,838 H
Production amounts		10,545	10,175	12,395	11,285	11,285	12,395	12,950	6,198	12,395	12,395	11,285	7,308	130,610
Fixed costs per hour	1 781 13	62 818 115	60 613 971	73 838 837	67 226 404	67 226 404	73 838 837	77 145 054	36 010 /18	73 838 837	73 838 837	67 226 404	43 531 852	778 062 968
Variable costs per hour	1 329 67	46 895 901	45 250 431	55 123 253	50 186 842	50 186 842	55 123 253	57 591 458	27 561 626	55 123 253	55 123 253	50 186 842	32 498 037	580,850,990
Amortization per hour	326.46	11 514 000	11 110 000	13 534 000	12 322 000	12 322 000	13 534 000	14 140 000	6 767 000	13 534 000	13 534 000	12 322 000	7 979 000	142 612 000
Overal absorption	3 437 26	121 228 016	116 974 402	142 496 090	12,322,000	12,322,000	142 496 090	148 876 511	71 248 045	142 496 090	142 496 090	129 735 246	84 008 889	1 501 525 958
	3,437.20	121,220,010	110,374,402	142,430,030	123,133,240	123,133,240	142,430,030	140,070,011	71,240,045	142,430,030	142,430,030	123,733,240	04,000,003	1,501,525,550
Current absorbtion														
		Januar	Februar	Mart	April	Maj	Juni	Juli	Avgust	Septembar	Oktobar	Novembar	Decembar	Godina
		30,300 H	363,595 H											
		9,174	8,852	10,784	9,818	9,818	10,784	11,267	5,392	10,784	10,784	9,818	6,358	113,632 H
	tariffa													
	media std													
Fixed costs per hour	1781.13	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	53,967,378	647,608,536
Variable costs per hour	1329.67	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	40,288,519	483,462,232
	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
Amortization per hour	326.46	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	9,891,739	118,700,866
	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0
Overall absorption	3437.26	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	104,147,636	1,249,771,634
Difference in amounts		-1,371	-1,323	-1,611	-1,467	-1,467	-1,611	-1,683	-806	-1,611	-1,611	-1,467	-950	-16,978
a absorbtion of fixed costs														
		Januar	Februar	Mart	April	Mai	Juni	Juli	Avaust	Septembar	Oktobar	Novembar	Decembar	Godina
Fixed costs		-8 850 737	-6 646 593	-19 871 459	-13 259 026	-13 259 026	-19 871 459	-23 177 676	17 047 960	-19 871 459	-19 871 459	-13 259 026	10 435 526	-130 454 432
Amortization		-1 622 261	-1 218 261	-3 642 261	-2 430 261	-2 430 261	-3 642 261	-4 248 261	3 124 739	-3 642 261	-3 642 261	-2 430 261	1 912 739	-23 911 134
		1,022,201	1,210,201	0,042,201	2,400,201	2,400,201	0,042,201	4,240,201	0,124,100	0,042,201	0,042,201	2,430,201	1,012,700	20,011,104
II difference in absorption		-10,472,998	-7,864,854	-23,513,720	-15,689,287	-15,689,287	-23,513,720	-27,425,937	20,172,698	-23,513,720	-23,513,720	-15,689,287	12,348,265	-154,365,566

to the hour of production, as shown in Table 6. The Table shows that Variable costs per hour are 1,330 RSD, while Fixed costs per hour are 2,108 RSD. Based on these parameters, we can calculate the amount of transformation costs per unit of finished product. Eventually, by summation of costs of materials per unit and transformation costs per unit, we get the cost price of our finished products in the budget. For the purpose of this paper, we have defined selling price as the price which contains 10% of profit margin related to cost price in order to present selling prices as shown in the table below.

By calculating the selling price, we are able to create complete Income statement. Thus, our budget is ready to be approved by the company's management.

The above given example shows the company's budget of 292.7 million RSD. Eventually, we would like to highlight that the budget can be shown as the analysis of variance compared to the current situation. The parameters of the first eight months of the current year are mostly taken as the basis, along with forecasts for the following four months. The analysis of variance with 8+4 assessment (8 current months and 4 evaluation months) is then done according to such scenario until the next year's budget, but this is not the subject of this paper.

2.1 The Influence of Fixed Costs on the Results within Changes in the Production Volume - Absorption

The characteristic of fixed costs is the fact that they remain the same in the absolute amount throughout the whole period, regardless of the production level. The best example for this is amortization, which is calculated once per year based on the percentage of amortization of each means, and depending on whether the means is the property, equipment or, for instance, a car. Based on this information, we can define various amortization rates. Based on the allocation of fixed and variable costs in the budget, we can define the absorption rate due to the change in the production level, i.e. due to the influence of fixed costs per hour of direct work. This is very significant as we can depict the actual production level with budget parameters, the so-called Flex Budget or Corrected Budget, *i.e.* budget corrected for the current production level.

The above-given table shows the difference in the absorption of fixed costs due to the decrease in the scope of production. In our example, this difference is 154 million RSD.

Table 10.	The influence	of the change	in manufacturing	g mix on the rev	venues of a manu	facturing company
14010 10.	me minaemee	or the change	in manactaring	, mini on the re-	venues or a mana	indetailing company

	Product A	Product B	Overall
Material	10,000	12,000	
Variable costs/ h	1,330	1,330	
Fixed costs/h	2,108	2,108	
Transformation costs/h	3,437	3,437	
Production hours	3	4	
Transformation costs	10,312	12,890	
Cost price	20,312	24,890	
Profit margin	2,031	2,489	
Selling price	22,343	27,379	
Budget-sales kom	70600	60010	130610
Revenues 000/RSD	1,577,414	1,042,997	5,220,411
Realization-sales;	60010	70600	130610
Revenues 000/RSD	1,340,802	1,932,937	3,273,739
Difference 000/RSD	(236,612)	289,941	53,329

The analysis of variance 000/RSD	Budget	Vol Mix	Budget flex
Production volume	130,610	-16,978	113,632
Direct hours	436,838	-61,548	375,289
Working days	232	0	232
Direct material costs	1,426,120	-169,760	1,256,360
Direct labour costs	174,735	-21,230	153,505
Indirect labour	52,421	141	52,562
Administration	18,101	-7,220	10,881
Labour costs	245,257	-28,309	216,947
Material write-offs	71,306	-10,047	61,259
Indirect material	99,828	-11,955	87,873
Services	216,000	0	216,000
Energy costs	426,523	-50,606	375,917
Other costs	300,000	0	300,000
Load costs	1,184,179	-79,687	1,104,492
Transformation costs	1,358,914	-100,917	1,257,997
Amortization	142,612	0	142,612
Overall transformation costs	1,501,526	-100,917	1,400,609
Overall production costs	2,927,646	-270,677	2,656,969
Increase/ decrease in supply value	0	0	0
COGS	2,927,646	-270,677	2,656,969
Overall sales	3,220,411	-393,721	2,826,690
Result	292,765	- 123,043	169,721

2.2 The Influence of the Change of Manufacturing/Selling Programme - Mix

The influence of manufacturing/ selling mix is a change in the structure of production/ sales, i.e. different ratio between products. This influence is mostly small and it can lead to the increase or decrease in costs per production unit, as, for example, products have different production time, different prices of direct material and different mix affects the overall result, if these differences in prices of specific products are significant. What does this imply? When a product mix is changed, there is a different allocation of costs as well as revenues, which might cause different results. In the example below, we present a difference in revenues due to different selling mix regarding the company's revenues. In this case, the overall sale has remained the same, but by changing manufacturing mix, higher revenues are accomplished. This does not automatically imply better result, but it definitely means a deviation in the budget which needs to be explained.

Eventually, by taking into consideration manufacturing/ selling mix and absorption, we get a budget corrected for the current level of production/ sales. The table below shows the budget created due to the decrease in production of 16, 978 units, the corrected budget (Flex Budget) of 169.7 million RSD.

2.3. The influence of effectiveness on the result

Effectiveness is one the variances after defining the budget corrected for the current production level. The measurement of effectiveness is done for all production costs starting from the material. When we talk about effectiveness in material, we mostly refer to technical and technological solutions regarding the decrease in direct material per product unit, taking care of product quality and functionality (Cvetinovic, 2013). By using these technical and technological solutions, we are able to decrease cost price of material per product unit and to show effectiveness compared to the state in the time of budget creation. This is a continuous process and it depends on the technological progress of the industry branch to which the company belongs, competition and needs of target customers. Needless to say, this can sometimes lead to the increase in material costs due to quality needs or market demands, which is defined as ineffectiveness compared to the state during budget creation.

Direct labour is presented immediately after the material. Effectiveness in direct labour is shown in the time frame necessary to produce a finished product. Operational lists which contain a detailed description of each operation are used to measure production time. By analysing operational lists, work place, and by introducing new technological solutions in the production process, as well as minor improvements in automatization, we can decrease production time per product unit and therefore show effectiveness in direct labour. There is a whole study based on direct labour. It can be divided into value added activities and non-value added activities. By decreasing non-value added activities, we have an impact on our labour effectiveness. Another important aspect of direct labour is Saturation of workers. It stands for actual employment, *i.e.* workers' activities. The opposite term would be Desaturation, which practically represents the time a worker spends between two operations, due to technological process. By decreasing Desaturation we also affect labour effectiveness. Other costs follow labour analysis, such as costs of internal write-offs and indirect material. These costs are usually 100% variable, which means that they depend directly on the production level. Furthermore, this implies that they can be followed along with production level as some type of key performance indicator and they can be defined as cost per product unit (PriceWartehouseCoopers, 2007). This is how we can conclude whether we are efficient in the realization or not, when compared to the budget. Relatively variable costs partly follow production volume and they are partly fixed. This means that one part of these costs stays fixed for all production stages. By focusing on the decrease in these costs, we affect both effectiveness and a certain amount of fixed costs per product unit, which can lead to positive overall effects.

Table 12. An example of variance of effectiveness of a manufacturing company

The analysis of variance 000/RSD	Budget	Vol Mix	Budget flex	Effectiveness
Production volume	130,610	-16,978	113,632	0
Direct hours	436,838	-61,548	375,289	0
Working days	232	0	232	0
Direct material costs	1,426,120	-169,760	1,256,360	0
Direct labour costs	174,735	-21,230	153,505	-3,389
Indirect labour	52,421	141	52,562	3,962
Administration	18,101	-7,220	10,881	6,399
Labour costs	245,257	-28,309	216,947	6,972
Material write-offs	71,306	-10,047	61,259	7,858
Indirect material	99,828	-11,955	87,873	2,608
Services	216,000	0	216,000	-6,000
Energy costs	426,523	-50,606	375,917	-70
Other costs	300,000	0	300,000	0
Load costs	1,184,179	-79,687	1,104,492	14,757
Transformation costs	1,358,914	-100,917	1,257,997	11,368
Amortization	142,612	0	142,612	-16,944
Overall transformation costs	1,501,526	-100,917	1,400,609	-5,576
Overall production costs	2,927,646	-270,677	2,656,969	-5,576
Increase/ decrease in supply value	0	0	0	0
COGS	2,927,646	-270,677	2,656,969	-5,576
Overall sales	3,220,411	-393,721	2,826,690	0
Result	292,765	- 123,043	169,721	5,576

Energy costs can be very significant in some industrial branches, which implies bigger control of energy consumption by measuring the amount of used fuels, which is then compared to the planned amounts. Some companies install measurers in order to be able to follow energy consumption on a daily basis and to affect the level of energy consumption within the planned boundaries. As we have already mentioned, fixed costs do not depend on the production stage. Apart from the previously discussed amortization example, there is, for instance, the cost of production services which are mostly signed for the annual period. From the point of view of effectiveness, every takeover of these activities by a company will affect the effectiveness regarding these costs. Finally, we should say that effectiveness is under direct responsibility of people from the production department, *i.e.* production managers. Measurement of production performance, *i.e.* of production manager is done by this variance. The table below offers an example of effectiveness variance.

2.4. The Influence of price change on result - Price variance

Like effectiveness, price can be regarded in all production costs. In this paper, we have assumed that the selling prices have remained stable throughout the whole year, which does not have to be the case in practice. On the contrary, the analysis of variance and budget revision during the year can show the necessity for correction of selling prices if a company wants to do business successfully and maximize its profits.

First of all, we will consider price change of direct material. As direct material participates in the cost price in many industries, the deviation from the planned price can lead to huge fluctuations and deviations in the overall material. Therefore, the prices of direct material have to be followed carefully. The responsibility for the prices of direct material is in the hands of procurement sector and, of course, sector supervisor. Every deviation should be explained and the solution to the newly created problems has to be found.

What follows the material is labour cost. The policy of incomes is under direct responsibility of the HR department. However, time management is under the responsibility of sector supervisors. What does this mean? Every income increase affects the increase in timetable of direct and indirect workers, as well as payments of workers in administration. Overtime work which is not planned, as well as working on weekends and holidays, can also lead to increased labour costs which can be explained by price deviation. All those in charge have to take care of the fact that labour costs amount to planned limits in order to avoid any deviations. Otherwise, each of them has to explain what has happened. Energy costs are the next big expense. As it has already been mentioned, these costs are pretty high in some industries, so good estimation of future prices of fuels is of key significance. Any deviation from the planned cost is achieved when current spent amounts are multiplied with budget prices, and those values are subtracted from current costs.

2.5. Analysis of Variance - Results - Overview

The analysis of variance of results comes from two sides. On one hand, there is the planned result, which is corrected after the realization for the new product/ sales result. On the other hand, there are actual product costs and actual incomes due to sales of finished products. The difference between these values for every costs and income is explained by effectiveness and price variance. The variance of currency can also be included in the analysis, if a company is somehow connected to foreign countries in the area of ownership, material procurement and sales of finished products abroad. However, for the purpose of this paper, we have remained in the area of domestic economy. An overview of analysis of variance is shown in the table below.

Apart from the table overview, a graphic overview offers a better macro image which clearly shows deviations regarding responsibilities.

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Table 13	Review c	of complet	e hiisiness	result of a	manufacturing	company
rubic 15.	10010000	n compiet	c buonicoo	result of u	mananactaring	company

The analysis of variance 000/RSD	Budget	Vol Mix	Budget flex	Effectiveness	Price	Realization
Production volume	130,610	-16,978	113,632	0	0.00	113,632
Direct hours	436,838	-61,548	375,289	0	0.00	375,289
Working days	232	0	232	0	0.00	232
Direct material costs	1,426,120	-169,760	1,256,360	0	320.22	1,256,680
Direct labour costs	174,735	-21,230	153,505	-3,389	15,011.58	165,127
Indirect labour	52,421	141	52,562	3,962	49.72	56,574
Administration	18,101	-7,220	10,881	6,399	864.00	18,144
Labour costs	245,257	-28,309	216,947	6,972	15,925.30	239,845
Material write-offs	71,306	-10,047	61,259	7,858	0.00	69,117
Indirect material	99,828	-11,955	87,873	2,608	0.00	90,481
Services	216,000	0	216,000	-6,000	0.00	210,000
Energy costs	426,523	-50,606	375,917	-70	0.00	375,847
Other costs	300,000	0	300,000	0	0.00	300,000
Load costs	1,184,179	-79,687	1,104,492	14,757	914	1,120,163
Transformation costs	1,358,914	-100,917	1,257,997	11,368	15,925	1,285,291
Amortization	142,612	0	142,612	-16,944	0.00	125,668
Overall transformation costs	1.501.526	-100.917	1,400,609	-5,576	15.925	1.410.959
Overall production costs	2,927,646	-270,677	2,656,969	-5,576	16,246	2,667,639
Increase/ decrease in supply value	0	0	0	0	0.00	0
COGS	2,927,646	-270,677	2,656,969	-5,576	16,246	2,667,639
Overall sales	3,220,411	-393,721	2,826,690	0	0.00	2,826,690
Result	292,765	- 123,043	169,721	5,576	- 16,246	159,051



Graphic 1. Graphic overview of analysis of variance

We will briefly comment on the business results. As regards to the planned production volume, the company experienced a decrease in 16,978 units. The result correction of 123 million RSD is explained by difference in absorption of 154 million RSD (NB: page 10) and by positive mix of 31.3 million RSD. The company has generated ineffectiveness of transformation costs in the amount of 11.4 million RSD, whereas effectiveness in direct labour is 3.4 million RSD. Thus, the company has shown ineffectiveness in indirect labour and costs of administrative workers. The costs of write-offs have been increased per product unit, which has led to ineffectivenes of 7.9 million RSD, as well as to excessive consumption of indirect material in the amount of 2.6 million RSD. On the other hand, savings have been done in services costs in the amount of 6 million RSD. Amortization costs are also less than planned as result of postponed investments, which has caused lower amortization costs of newly activated means.

When it comes to price variance, the variance of material price is particularly considered, due to the already mentioned influence on the overall result. In this case, the company has a negative effect on the prices of direct material in the amount of 320 thousand RSD. Regarding other costs, the biggest increase in prices is seen in direct labour, which is the consequence of correction of income for direct workers which has not been planned in the budget, as well as the consequence of unplanned overtime hours and working hours during the weekend. The increase in income refers to income of administrative workers, so the company has an increase in prices regaring these costs in the amount of 864 thousand RSD.

3. SUMMARY

The analysis of variance is a very significant tool for a company's management in order to be able to perceive the current result and the level of deviation, in relation to which certain actions can be taken for the purpose of correction and improvement of the company's performances. The analysis of variance indicates the company's departments which need to be taken care of, as well as where to focus their actions. The existence of good communication between the parties involved in the production process is crucial, whether these parties are directly or indirectly included. Eventually, we should comment on the software support which is used by the companies worldwide to facilitate business decision making process, but also to measure their performance and monitor the work of the overall system. The most famous software solutions in contemporary business are: SAP, Oracle, SAS and Microsoft solution. The leading solution is SAP, due to its functionality, expertise and representation in the biggest world companies. SAP is in charge only of business applications, and it enables collaboration, integration and connection of business processes by means of the state-ofthe art technologies. By system integration, financial managers get a unified image of all financial and business activities, as well as the ability to completely measure and manage risks, profits and performances of internal functions, but also the entire business system. SAP solutions have become the global practice and they represent the standards of business management for various industries.

In the times of high technological development, when the competition for gaining buyers has become the supreme goal of each company, companies have to find a way to keep up with the global tendencies and win over the competition by offering a product of the highest quality, with the lowest production costs. Finding the way to decrease production costs is the supreme goal of people employed in the production departments of companies. In order to follow the results, the analysis of variance is a very strong tool. If everyone contributes to the more effective usage of material, workforce, energy and resources, depending on their responsibilities, the company can offer better product and ensure benefits both for the buyer and the owner of the company.

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ANALIZA VARIJANSI REZULTATA PROIZVODNE KOMPANIJE

Apstrakt:

U savremenom poslovanju koje je jako dinamično i podleže brzim promenama veoma je važno raspolagati tačnim i relevantnim informacijama o kretanjima u procesu proizvodnje i na osnovu toga donositi adekvatne odluke koje će obezbediti uspeh kompanije u budućnosti. Kako klasično računovodstvo nije u mogućnosti da odgovori na ove izazove, potrebno je naći način da se na bazi računovodstvenih kretanja, ali sa više detalja, omogući bolje razumevanje procesa proizvodnje i uticaja različitih faktora na krajnji rezultat i cenu koštanja proizvoda. Razvijeno je nekolilko različitih obračuna cene koštanja koje imaju prednosti i mane u zavisnosti od složenosti proizvodnje i zahteva menadžmenta. Analiza varijansi predstavlja alat pomoću kojeg finansijski kontrolori i i finansijsko rukovodstvo kompanija tumače odstupanja poslovnih rezultata u odnosu na rezultate predviđene budžetom ili revizijom budžeta tokom godine. Cilj ovog rada jeste da ispita varijanse rezultata proizvodne kompanije, koja je rezultat dobrog upravljačkog računovodstva. U radu se daje primer jedne proizvodne kompanije, kao i tok od budžeta (koji predstavlja osnovu za analizu varijansi) do realizacije i analize odstupanja između ova dva scenarija.

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Ključne reči:

analiza varijansi, budžet, planiranje, menadžment, poslovni rezultat.