Reducing economic risk by improving production

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Abstract. Reducing economic risk is a constant concern of companies to survive in the market. In this study, the economic risk was analysed through the prism of two possible variants: the level of the physical volume of the production or the refurbishment. It was found that it can be reduced in both situations due to the existence of several production options, that economic risk is directly related to operating profit when the change is made only by increasing the quantity of the first product and decreasing to the second product. In the case of refurbishment, the connection is reversed, respectively, when the operating profit decreases, the coefficient of the operational leverage increases. The 25% increase in sales revenues produces more favourable effects in the case of refurbishment.

1. Introduction

In the globalized economy, the sources of economic risk faced by enterprises are determined by the internal conditions they have vis-à-vis the factors of production involved on the one hand [1-2] and on the other hand by dependence on the conditions market, which depending on the specifics of the industry and the economic rules adopted can create greater or lesser advantages [3-5]. The complexity determined by the product variants, the number and the differentiation of the manufacturing processes must, in most cases, be correlated with the product architecture [6-7]. The impact of product portfolio complexity on processes across the entire value chain is tracked by managers to make decisions [6,8]. On the other hand, the increasing dynamics of the market, as well as the growing need to introduce new technologies to match the production capacity is sometimes interdependent with the complexity induced by the variety of products [9,10]. In recent decades, many countries have experienced economic growth because of improved production efficiency and modernization of production through the progress of industrialization [10,11]. It is considered that the success of companies when they are in strong competitive environments depends on their ability to adapt and balance so that they can use their entire production capacity [12-13].

In this paper we started from the need for continuous improvement of production by establishing the physical volume of production when there is more than one product (2 products) for which the manufacturing technology allows the adaptation of production. Because the economic risk associated with each production option can be an impediment, this risk and its evolution have been calculated when sales of one product increase to the detriment of another product. Subsequently, it was wanted to measure the evolution of the economic risk when the refurbishment occurs, the impact on the operational profit and other factors that are affected.

2. Material and method

This study considers the analysis of the economic impact given by the decision to improve production by choosing to change the physical volume of production (variant 1) or to replace the manufacturing method by acquiring a technological line. For this, a company was chosen that produces 2 products and has the possibility to alternate the quantities related to the two products. As the company must decide on the physical level of the products and the assortments associated with them, it is desired to identify whether there are variations of the economic risk in relation to these decisions of the company. For this study it was considered that there is a market and production capacity according to the variants provided in Table 1.

Table 1. The situation of the production possibility depending on the physical volume

Product type / Production options	1	2	3	4	5	6	7
A	10	20	30	40	50	60	70
B	70	60	50	40	30	20	10

The study used the concrete information existing at the level of the sale price and the costs incurred by the company for a month of production, which are presented in Table 2.

Table 2. The situation of specific information at enterprise level

No	Indicator	Unit	Possibility 1 Product Type		TOTAL	Possibility 2 Product Type		TOTAL
			A	B		A	B	
1	Unit selling price	lei	350	420	x	350	420	x
2	Variable unit costs	lei	240	330	x	120	160	x
3	Total fixed expenses	lei	x	x	5,200	x	x	16,200

In the analysis of the influence of the changes, the assortment of the finished production on the economic risk of the production enterprise was used the method of the equation and the method of the contribution margin. For this, the total contribution margin was calculated as the ratio between the revenues from the sale of finished products (VV) and the total variable expenses (CV), according to equation (1).

$$M_{CT} = \frac{VV}{CV} \tag{1}$$

Subsequently, the unit contribution margin was calculated as the ratio between the total contribution margin (MT) and the physical volume of the manufactured production (Q), according to equation (2).

$$M_{Cu} = \frac{M_{CT}}{Q} \tag{2}$$

To observe the effect produced by the change of the physical volume of production at the level of the two assortments, taken into study, the operating profit was calculated as the difference between the total contribution margin and the fixed expenses, according to equation (3).

$$P_o = M_{CT} - CF \tag{3}$$

The operational leverage ratio (CLO) was calculated to evaluate the sensitivity of the result to the variation of the level of the basic activity carried out in the enterprise, according to equation (4).

$$CLO = \frac{VV-CV}{VV-CV-CF} = \frac{M_{CT}}{P_o} \tag{4}$$

The analysis was chosen through the operational leverage ratio because it is the indicator that allows managers to choose the optimal production strategy by managing consumption, thus showing the level of effectiveness and the economic risk associated with the decisions taken.

3. Results and discussion

Following the study, Table 3 was obtained, which includes the situation registered by the company if it were to improve only the level of the share of products in production, according to the production capacity.

Table 3. Activity situation by changing the share of products in production (possibility 1)

Options	Product Type / Indicator	Q	VV	Cv	CV	M_{CT}	M_{cu}	CF	Po	CLO
1	A	10	3,500	240	2,400	1,100	110	5,200	2,200	3.36
	B	70	29,400	330	23,100	6,300	90			
2	A	20	7,000	240	4,800	2,200	110	5,200	2,400	3.17
	B	60	25,200	330	19,800	5,400	90			
3	A	30	10,500	240	7,200	3,300	110	5,200	2,600	3.00
	B	50	21,000	330	16,500	4,500	90			
4	A	40	14,000	240	9,600	4,400	110	5,200	2,800	2.86
	B	40	16,800	330	13,200	3,600	90			
5	A	50	17,500	240	12,000	5,500	110	5,200	3,000	3
	B	30	12,600	330	9,900	2,700	90			
6	A	60	21,000	240	14,400	6,600	110	5,200	3,200	2.63
	B	20	8,400	330	6,600	1,800	90			
7	A	70	24,500	240	16,800	7,700	110	5,200	3,400	2.53
	B	10	4,200	330	3,300	900	90			

From the analysis of Table 3 it is observed that as the quantity of product A increases and the quantity of product B decreases, the operational profit begins to increase, and the coefficient of the operational leverage to decrease. At first glance, although the price of product A is lower than that of product B, it produces superior advantages. The calculations made for the first production option show that the 1% change in sales revenue leads to a 6.69% increase in operating profit (% of sales revenue) while in option 7 a 87.23% decrease in revenue from sales (compared to option 1) there is an increase in operating profit by 54.55%. In Table 4, the situation registered by the enterprise was obtained if it would achieve the improvement by introducing a production line that leads to the increase of the fixed expenses and to the reduction of the variable unit expenses.

Table 4. Situation of the activity through the acquisition of a technological line (possibility 2)

Option	Product Type/ Indicator	Q	VV	Cv	CV	M_{CT}	M_{cu}	CF	Po	CLO
1	A	10	3,500	120	1,200	2,300	230	16,200	4,300	4.77
	B	70	29,400	160	11,200	18,200	260			
2	A	20	7,000	120	2,400	4,600	230	16,200	4,000	5.05
	B	60	25,200	160	9,600	15,600	260			
3	A	30	10,500	120	3,600	6,900	230	16,200	3,700	5.38
	B	50	21,000	160	8,000	13,000	260			
4	A	40	14,000	120	4,800	9,200	230	16,200	3,400	5.76
	B	40	16,800	160	6,400	10,400	260			
5	A	50	17,500	120	6,000	11,500	230	16,200	3,100	6.23
	B	30	12,600	160	4,800	7,800	260			
6	A	60	21,000	120	7,200	13,800	230	16,200	2,800	6.79
	B	20	8,400	160	3,200	5,200	260			
7	A	70	24,500	120	8,400	16,100	230	16,200	2,500	7.48
	B	10	4,200	160	1,600	2,600	260			

From the analysis of Table 4 we can see the inverse situation compared to possibility 1, ie as the quantity of product A increases and the quantity of product B decreases, the operating profit decreases, and the coefficient of the operational leverage begins to increase. This situation is explained because of the share of variable and fixed expenses in the selling price of the product. In Table 4 we can see that in variant 1, for product A the unit variable expenses have a weight of 68.57% while in product B a weight of 78.57%, and in variant 2, for product A we have a weight of 34, 29% and for product B we have 38.1%. Thus, the higher the share of variable expenditures has a higher share in total revenues (variant 1: 70% ÷ 77.51%; variant 2: 34.84 ÷ 37.69), the lower the operating profit and the higher the operational leverage ratio.

Figure 1 shows the evolution of operating profit in the two variants studied.

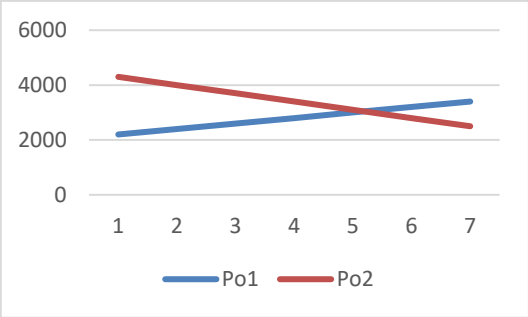

Figure 1. Evolution of operating profit

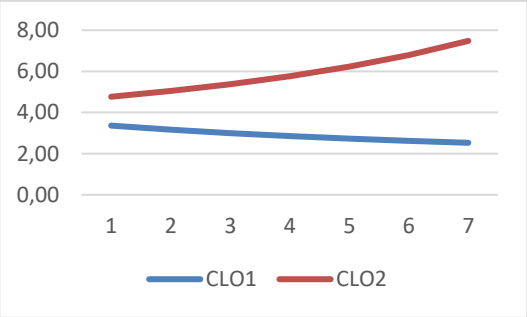

Figure 2. Evolution of the operational leverage ratio

From the analysis of Figure 1 in possibility 1 of improving production although the selling price for product A is lower than the selling price for product B, as the quantity of product A increases to the detriment of product B, according to production capacity, we have an increase in operating profit, an increase determined by the decrease in variable expenses. If we analyse the possibility 2 we can observe that the operational profit decreases as the quantity of product B decreases, this due to the improvement of the production by introducing a technological line that determined lower variable expenses, and increase of fixed expenses. The maximum operational profit in variant 1 (2,200 ÷ 3,400) is lower than that obtained in variant 2 (2,500 ÷ 4,300), as well as the economic risk given by CLO, which allows practically the differentiation in economic terms between the 2 decisions. From the analysis of Figure 2 we notice that in possibility 1 the economic risk calculated through CLO decreases (3.36 ÷ 2.53) while in possibility 2 the effect is opposite (4.77 ÷ 7.48). Both the minimum and the maximum threshold registered by CLO is different for the 2 possibilities studied, which makes us understand that any variation in the level of sales revenues produces much stronger effects in possibility 2 than in possibility 1. To be able to see the level of sensitivity of the production, the changes related to the increase by 25% of the sales revenues and of the variable expenses for possibilities 1 and 2 were calculated, according to Tables 5 and 6.

Table 5. Variable income and expenditure statement (possibility 1)

Option	ΔVV	ΔCV	ΔCF	ΔPo	ΔPo (%)	ΔCLO	ΔCLO (%)
1	8,225	6,375	0	1,850	184	-1.08	68
2	8,050	6,150	0	1,900	179	-0.96	70
3	7,875	5,925	0	1,950	175	-0.86	71
4	7,700	5,700	0	2,000	171	-0.77	73
5	7,525	5,475	0	2,050	168	-0.70	74
6	7,350	5,250	0	2,100	166	-0.64	75
7	7,175	5,025	0	2,150	163	-0.59	77

Table 6. Variable income and expenditure statement (possibility 2)

Option	ΔVV	ΔCV	ΔCF	ΔPo	ΔPo (%)	ΔCLO	ΔCLO (%)
1	8,225	3,100	0	5,125	219	-2.05	57
2	8,050	3,000	0	5,050	226	-2.26	55
3	7,875	2,900	0	4,975	234	-2.51	53
4	7,700	2,800	0	4,900	244	-2.81	51
5	7,525	2,700	0	4,825	256	-3.18	49
6	7,350	2,600	0	4,750	270	-3.64	46
7	7,175	2,500	0	4,675	287	-4.22	44

The analysis of Table 5 shows that a 25% increase in the two indicators determines for the first variant a change in operating profit from 184% to 163% (in the sense of increase) and the operational leverage ratio from 68% to 77% (in the sense of decrease). The analysis of Table 6 shows that the same 25% increase in sales revenues and variable expenses causes a much more significant increase in operating profit in variant 2, from 219% to 287% and a decrease in the operational leverage ratio. 44% and 57%.

4. Conclusions

In the first possibility studied, sales revenues decrease as the quantity increases for product A and decreases for product B. This type of production, from option 1, determines decreasing total variable expenses, increasing operational profit and a decreasing operational leverage ratio. In Option 2, sales revenue begins to decline as the quantity of product A increases and the quantity of product B decreases.

This type of production, from option 2, determines total variable expenses decreasing, operating profit decreasing and a coefficient of the operating lever increasing. In this variant, there is an increase in total fixed expenses because of the refurbishment.

The analysis of the changes in the two possibilities studied, because of the increase in sales revenues and variable expenses by 25%, highlights the existence of more significant changes in option 2 compared to possibility 1 in terms of operating profit.

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