

## THE RELEVANCE OF FIXED COSTS IN THE DIAGNOSIS OF OPERATING RISK TO SME'S

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**Abstract:** *Due to their weak capitalization and low negotiation power on the market, small and medium-size enterprises (SME) have a high vulnerability to changes in the environment they operate. These vulnerabilities can significantly increase the operational risk of the business, going as far as compromising it. Particularly in areas of activity where technical capital is a business force, the level of fixed costs can be the main factor of operational risk. In view of this, the present paper aims to develop a simple and effective instrument for assessing operating risk to SME's based on variation of some main indicators such as total sales, prices, fixed costs, variable costs. The proposed risk evaluation model, use two aggregate indicators: degree operating leverage (DOL) and business security interval ( $I_s$ ), calculated as an expression of enterprise's economic performance, market position and level of capitalization (investment). Following the trend of these indicators is evaluated the trend of the operational risk of the business. The method proposed for evaluation of operating risk includes the main steps that are required to be followed under scientific control. These are presented in a decisional logic structure, in order to optimize the management decision in terms of minimizing the risk of the business which is objectively assessed through calculation. This way increases significant the applicative character of the method. The paper includes a case study to illustrate how to apply the method to a SME's type company.*

**Key words:** *operating risk, fixed costs, variable cost margin, security interval, investments.*

### 1. INTRODUCTION

It is known that SMEs are subject to a higher operating risk than large businesses, mainly due to weaker market positions, which means low predictability and high sales fluctuations [2, 4, 5]. The primary indicators of potential problems generating operating risk for an organization is the inappropriate or inadequate strategic allocation and utilization of resources [4]. Researches approached identify correlation between business growth rate and net profit, and the potential disturbances. According to them, approximately 32% of the SMEs are dissatisfied with their existing "net profit" (of which 10% are very dissatisfied) and about 40% are dissatisfied with "business growth" [4].

From a technological point of view, SMEs do not have access to the top levels in the field in which they operate, as they are reserved for large enterprises that carry out parallel research and development activities. Similarly, with regard to the technical capital available to them, SMEs are weaker and not at peak levels, in many cases being acquired at second hand, often requiring repairs or maintenance. Both situations considerably weaken the market position of SMEs, which often fail to meet customer demand both in terms of quantity and quality of products.

From an economic point of view, the situation generates mainly fixed costs (depreciation, repairs,

maintenance) while the benefits do not rise to the maximum due to the low productivity of the technical capital and the low selling prices. In addition, sales are becoming more and more fluctuating, customers preferring large businesses and buying from SMEs only in special situations (rare or out-of-the-factory products, low-priced sales, temporary shortage of stocks at large manufacturers).

In terms of reduced production range and volumes and often of quality, but with a high degree of flexibility in management and manufacturing, the SME adapts especially to the business environment, trying to exploit the opportunities of the markets on temporary segments not covered by large enterprises [4]. The situation is mainly due to unpredictable developments in supply and demand and high rigidity of large enterprises that adapt more slowly to the requirements of the markets [4]. Add to this the significant effect of seasonality of the business markets such benefits achieved in only a few times of the year, otherwise consuming the accumulation periods of the season [2].

From a strategic point of view, SMEs are in the position to choose one of the following alternatives:

S1. Limiting activity to a number of products/services ensuring a high return on the market by increasing prices, even in conditions of low efficiency of manufacturing; the strategy involves minimal or even negative investment, but instead takes on high resource consumption and low sales but with high added value, determined by the high sale price; the high fluctuation in sales must also be taken into account.

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S2. Developing activity in the sense of increasing the volume, quality and range of products that ensure a high return on the market by the number of products / services sold; the strategy implies investments (I) that lead to a decrease in resource consumption and increase of value added even under low price conditions;

S3. Discarding the business and leaving the market; the situation may sometime lead to company insolvency.

The first two strategic alternatives may lead to an increase in time of the operating risk manifested by the reduction of the economic result. Consequently, it is important to evaluate each of the two options in terms of the influence on the outcome and the economic risk.

## 2. THEORETICAL BASES OF RESEARCHES

The risk indicators have potential linkages with day-to-day operational disturbances, which degrade business performance and the business environment [4]. In consequence, the disturbances ultimately play a vital role in putting an organization at risk in terms of production, safety, and financial, resulting from both internal and external customer dissatisfaction [5].

The economic outcome is evaluated by the cost-volume-profit model based on the relationship (1) [1]

$$R = \mu \cdot V - F = q(p - v) - F, \quad (1)$$

where:

- $\mu = \frac{p-v}{p}$  = variable cost margin coefficient;
- $p$  = unit sale price;
- $v$  = unit variable cost;
- $V = p \cdot q$  = total sales;
- $q$  = manufactured quantity;
- $F$  = global fixed cost.

Economic (operational) risk is assessed through Degree Operating Leverage (DOL) expressing sensitivity operating result (R) to the variation in sales [6].

$$DOL = \frac{R + F}{R} = 1 + \frac{F}{q(p - v) - F} = 1 + \frac{F}{M - F}$$

$$DOL = 1 + \frac{1}{\frac{M}{F} - 1}, \quad (2)$$

where the variable cost margin is:

$$M = q(p - v). \quad (3)$$

According to the formula (2), for a given production level ( $q$ ,  $v$ ) and market ( $p$ ), operating risk increases as fixed costs increase ( $F$ ).

Thus, the economic risk is even higher as the enterprise shows a greater sensitivity of the result to the variation in sales, directly influenced by the fixed costs and the unit variable cost margin.

The maximum risk is assimilated to a high sensitivity of the result to the variation in sales, which means a variable cost margin close to the fixed cost level,  $M = F$  and  $DOL \rightarrow \infty$  [6].

The economic risk is non-existent when the economic outcome is maximum [6]:

$$\frac{dR}{dq} = \frac{d}{dq}[q(p - v) - F] = 0 \quad (4)$$

which means  $M = q(p - v) = 0$  and, according to Eq. (2) [6],

$$DOL = 0. \quad (5)$$

The economic risk is minor when the fixed expenses ( $F$ ) are relatively small compared to the variable ones and therefore,  $DOL = 1$  [6].

Also, the economic risk is even higher as the enterprise operates close to the profitability threshold (breakeven point), highlighted by the business security interval  $I_s$  [6].

$$I_s = \frac{v - v_{cr}}{v_{cr}} \cdot 100 = \frac{q - q_{cr}}{q_{cr}} \cdot 100 = \left(\frac{q}{q_{cr}} - 1\right) \cdot 100;$$

$$I_s = \left(\frac{M}{F} - 1\right) \cdot 100 \quad (6)$$

$$q_{cr} = \frac{F}{p - v}. \quad (7)$$

It is known [6] that a safety margin of up to 10% reflects an unstable situation, one of 20% a relatively stable situation and one over 20% a comfortable situation in relation to the profitability threshold. Under these conditions, ensuring an acceptable risk requires  $I_s > 1.2$  and by default:

$$M > 1,1 F \text{ and } DOL < 11. \quad (8)$$

If the first of the two strategic alternatives (S1), outlined in chapter 1, lead to an increase in economic risk following the reduction in the quantity of products sold and the unitary cost margin, the strategic alternative of development (S2) may also generate an increase in the economic risk due to the increase in fixed costs, following the investment (I), if it is not capitalized by a corresponding increase in the sales amount or the unit variable cost margin.

In both alternatives, the proportion between the variable cost margin ( $M$ ) and the fixed costs ( $F$ ) must be kept at least at the level established by the Eq. (8).

In the above logic, the decision to invest should not only be taken for technical or economic reasons, but also taking into account the impact on economic risk generated in particular by the increase in fixed costs. In this concern, the investment analysis should take into account its ability to generate an increase in the variable cost margin over the cost of depreciating the investment, and not only, as some investments attract other fixed costs such as those with personnel specialized or with various necessary collaborations (maintenance, service, insurance).

The meaning of the DOL values for economic risk, causes and impact on the company, is presented in Table 1.

DOL calculation and valuation are required not only in decisions that may increase fixed costs but also in those that can change the range of variable costs through the three variables in formula (3): manufactured quantity, unit sale price and unit variable cost.

*Table 1*  
**The meaning of DOL values for economic risk**

DOL	Economic risk
>101	Very high economic risk. The company is totally misfit to the market and to the business environment. High probability of exit from the market. Closing high-risk activities and selling specific assets can be a strategic solution. Onset of insolvency proceedings may be a strategic choice.
51...100	High economic risk. The company is insufficient adapted to the market and to the business environment. Fixed costs are above the required level and production costs (variables) are high due to a low efficiency in the consumption of the resources involved. Technical and technological restructuring must be taken into account in order to reduce the economic risk
11...50	The economic risk is above the average. The company has serious technical and technological problems, if not solved in time, can lead to a quick fall in profits. Technical and technological investments to diversify production and increase productivity are a good option and can significantly improve economic risk.
5...10	The economic risk is at the limit. The company use resources and engages costs similar to most competing businesses. The economic risk is mainly due to the low brand awareness that prevents the increase in sales prices. Investing in marketing is a good way to improve economic risk.
<5	The economic risk is low. The company is very well fitted to the market and to the business environment. Fixed costs are carefully managed. The high technical and technological level allows for the maximum efficiency of the resources engaged, the production cost being minimal. The company has in addition a brand that allows higher prices for sale. The recommended strategy is to maintain this level through research product development and brand marketing.

Thus, a decision to removal from production of a product as a result of lowering the sale price will increase the economic risk of the entire enterprise by lowering the quantity produced on the same level of fixed costs.

Also, the decision to keep a product in production even in the context of lowering market prices may increase the economic risk by lowering the unit variable cost margin.

In the process of crisis management, we recommend evaluating both decisions and choosing which one produces a smaller increase in economic risk or those that do not change the risk category (see Table 1).

### 3. RISK EVALUATION MODEL FOR SME

By embedding a structured risk management approach, organizational benefits such as greater transparency, an increased risk awareness, a controlled risk environment, better allocation of capital and an

improvement in the execution of the business plan can be achieved [7].

In the following we intend to establish a decision model that allows the timely choice of the optimal strategic alternative taking into account the economic trend of the selling markets and business environment, under conditions of scientific control of the economic risk.

The risk assessment model for SMEs takes into account the general conditions in which they operate, as well as the specific conditions of each evaluated enterprise.

Among the general conditions, it is noted:

- Bureaucracy, excessive taxation and controls, corruption, etc. which causes a non-economic growth of business costs for SMEs [3];
- The high share of fixed costs in total costs, determined by the minimum necessary investment level, as well as by the rigidity of price formation of some costs such as: wages, taxes, utilities;
- Inevitability of costs such as manufacturing licenses, operating authorizations, legally binding collaborations;
- The relatively low margin of unitary cost determines both lower production efficiency and sales price concessions resulting from low-power trading transactions with customers, especially if they are large enterprises;
- Generally reduced quantities of manufactured products due to low manufacturing capacities and inventory strategy at minimum levels;

Among the specific conditions of each enterprise, which can influence the economic risk, it is remarkable:

- Rigidity of location of activity (relocation difficulty) which determines the risk of increased location costs, significant for enterprises in tourism, commerce, agriculture;
- Rigidity of supply sources (dependence on a supplier);
- Dependence on some legal requirements, such as periodically renewal license, based on performance criteria (commerce, services, transport, tourism);
- Dependence on a highly fluctuating market that can cause an increase in manufacturing costs (agriculture, food, construction);

The proposed risk evaluation model, for SMEs, includes the following assessments:

1. The economic trend of the retail market, assessed by:
  - Turnover variation from the sale of own products ( $\Delta V$ ), expressed in variations in quantity and/or sale prices:

$$\Delta V = \sum(\Delta p \cdot \Delta q). \tag{9}$$

- The variation of margin variable cost ( $\Delta M$ ), as an expression of variations in variable cost of manufacturing and unit sales prices:

$$\Delta M = \sum \Delta q(\Delta p - \Delta v). \tag{10}$$

2. The business environment trend, assessed by the fixed cost variation ( $\Delta F$ )

3. Investment level (I), expressed in additional fixed cost units:

$$I = \Delta F . \tag{11}$$

4. The business risk, assessed by:

- Variation economic risk ( $\Delta DOL$ ) as an expression of variation sales units, fixed costs and variable costs margin:

$$\Delta DOL = 1 + \frac{1}{\frac{\Delta M}{\Delta F} - 1} . \tag{12}$$

- Business security interval variation ( $\Delta I_S$ ), as an expression of variation fixed cost and unit variable cost margin:

$$\Delta I_S = \left( \frac{\Delta M}{\Delta F} - 1 \right) . \tag{13}$$

Structurally, the decision model is presented in Fig 1.

The following steps are taken in the logic of decision making:

i. The economic trend of the market in the last "i" years is measured by the indicators  $\Delta V$  and  $\Delta M$ , calculated as follows:

$$\Delta V = V_n - V_{n-i} , \tag{14}$$

$$\Delta M = M_n - M_{n-i} . \tag{15}$$

ii. The business environment trend in the last "i" years is measured by the indicator  $\Delta F$

$$\Delta F = F_n - F_{n-i} . \tag{16}$$

iii. Calculate the degree operating leverage (DOL) for the last "i" year with the Eq.(2).

iv. The economic risk is assessed as follows:

- $DOL > 101$ , in each of the analyzed years, economic risk is very high and strategy S3, to abandon business, is recommended;
- $DOL < 101$ , in the last year or decreasing continuously during the analyzed period, economic risk is high and move to the next step.

v. Calculate the business security interval ( $I_S$ ) for the last year using formula (4), after having calculated variable cost margin (M) with formula (3).

vi. The value obtained is evaluated, as follows:

- $I_S > 0.1$  - to choose S1 strategic option (Fig. 1) which consists of limiting the production to those products that are sold under conditions of higher efficiency on the market;
- $I_S < 0.1$  - will move to assess the impact on business investment by correct indicators of variable cost margin ( $M_i$ ) and fixed cost ( $F_i$ ).

vii. The economic and business environment trends of the next "j" post-investment years are reevaluated through the indicators  $\Delta V$ ,  $\Delta M$  and  $\Delta F$ , calculated as follows:

$$\Delta V = V_{n+j} - V_n , \tag{17}$$

$$\Delta M = M_{n+j} - M_n , \tag{18}$$

$$\Delta F = F_{n+j} - F_n . \tag{19}$$

viii. Recalculating business security interval ( $I_S$ ) corresponding to each of the "j" years' post investment;

ix. The value obtained is evaluated, as follows:

- $I_S > 0.1$  – to choose S2 strategic (Fig. 1) option which consists of business development by providing investment;
- $I_S < 0.1$  – revising the initial strategic plan or choosing the S3 strategic option, to abandon the business.

Three circuits are identified in the decision-making process:

- The short circuit, which follows steps I through IV and leads to the strategic decision S3, to abandon the business when the economic risk is obviously very high;
- The average circuit, which follows steps I through VI and leads to the strategic decision S1, to reduce the activity when economic risk is high and company is insufficient adapted to the market and to the business environment;
- The long circuit, which follows steps I through IX and may leads to the strategic decision S2 to develop the activity, when the economic risk is above the average and company have financial resources to sustain investments or the decision S3 to abandon the business if it does not have.

It is noted that the long circuit can be prolonged by repeating steps vi to ix in various terms of the investment plan up to the final option of investing or giving up the business. In the proposed decision model, giving up a business, with average economic risk, is the ultimate

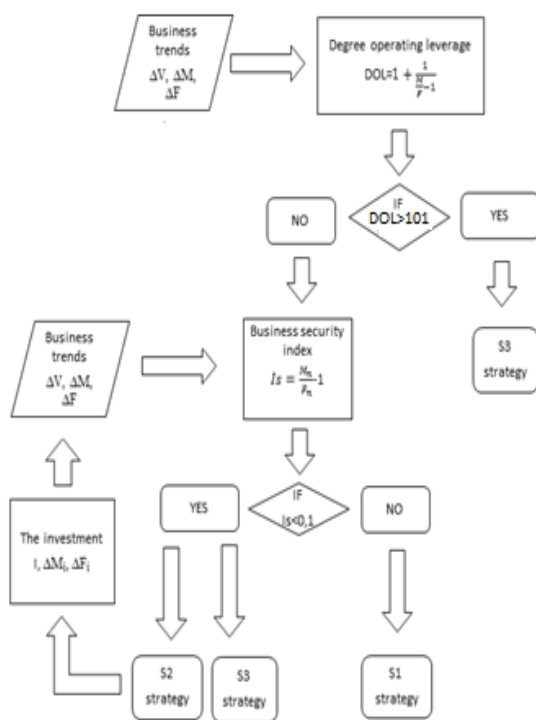


Fig. 1. Decision model.

solution only if the investment plan cannot be achieved in any of its variants.

**4. CASE STUDY**

It is subject to evaluation, the development strategy proposed by the executive management of a small enterprise in the field of packaging manufacturing costing on an investment plan for the assimilation into production of a new product.

The decision required to be taken is to approve or not the plan as proposed by the executive management.

According to the decision model presented in chapter 2, the economic and business environment trend of the last 3 years is evaluated, according to Table 1.

From the analysis, in the last three years shows the following:

- The economic trend is decreasing, a phenomenon evidenced by the decrease in sales (V) even though the share of variable costs in the price (Y) has decreased;
- The business environment trend is also decreasing, phenomenon evidenced by the increase in fixed operating costs even in the absence of investments;
- Over the past three years, the economic risk increased, DOL has doubled during this period;
- On the back of declining sales, business security deteriorates and is approaching to instability ( $I_s = 0.1$ ). During this period, fixed costs have a significant increase of 22350 lei, accounting for 17%, while variable cost margin increased slightly to 5422 lei, representing 3%.

According to the decision model (Fig. 1), considering the values of  $DOL < 11$  and degradation of business security, especially in 2016, from the comfortable zone to the relative stability ( $I_s$  slips to 0.1), it is necessary to continue the analysis in the sense of assessing the investment impact on business security.

According to the strategic plan, investments in total value of 25000 lei is amortized in 10 years. Assimilation of the new product will allow an increase in turnover of 2% in the first year, plus 1% each in the next 2 years, while keeping the variable cost margin coefficient at the level of 2016.

Fixed costs are projected to grow annually by 3.5%, this being the average growth rate over the past 5 years, plus the yearly 2500 depreciation of the investment.

Table 1

**Economic and business environment trends**

Indicators	2014	2015	2016
Turnover [V]	670814	513301	492582
Variable costs [CV]	503494	339655	319840
Margin variable costs [M]	167320	173646	172742
Variable cost margin coefficient [ $\mu$ ]	0.25	0.34	0.35
Fixed costs [F]	129731	136797	152081
Degree Operating Leverage [DOL]	4.46	4.71	8.69
Business security interval [ $I_s$ ]	0.29	0.27	0.14

Table 2

**Economic and business environment trends over the next three years by investment plan**

Indicators	2017	2018	2019
Turnover [V]	502400	517500	538200
Variable costs [CV]	326600	336400	349800
Margin variable costs [M]	175800	181100	188400
Variable cost margin coefficient [ $\mu$ ]	0.35	0.35	0.35
Fixed costs [F]	159900	165400	171100
Degree Operating Leverage [DOL]	11.1	11.64	10.9
Business security interval [ $I_s$ ]	0.10	0.09	0.10

In this respect the probable post-investment trend of the business, according to Table 2, is evaluated.

As it turns out, implementing the development plan, in the form proposed by the executive management, will lead to an increase in business risk over the next 3 years due to the increase in fixed costs even in the conditions of increased sales. As can be seen, the *DOL* increases above the maximum limit of 11 at least in the first two years after the investment and  $I_s$  is approaching to the minimum threshold of 0.1.

Thus, based on these conclusions, it is recommended that the executive revise the management's strategic plan to also increase the variable cost margin coefficient both by increasing unit selling prices and lowering unit variable costs.

For example, Table 3 shows the strategic trend following the revision of the strategic plan in the conditions of increasing the margin variable costs by reducing individual consumption and scrap.

The revised Strategic Plan simultaneously assures the increase in sales and the business security interval, starting with the second year of project implementation. Thus, the decisional model allows the investment plan to be completed with measures aimed at increasing the security of the business while ensuring the development project's reliability.

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Table 3

**Economic and business environment trends over the next three years by revised investment plan**

Indicators	2017	2018	2019
Turnover [V]	502400	517500	538200
Variable costs [CV]	321500	326000	333700
Margin variable costs [M]	180900	191500	204500
Variable cost margin coefficient [ $\mu$ ]	0.36	0.37	0.38
Fixed costs [F]	159900	165400	171100
Degree Operating Leverage [DOL]	8.63	7.37	6.13
Business security interval [ $I_s$ ]	0.13	0.16	0.19

be completed with measures aimed at increasing the security of the business while ensuring the development project's reliability.

## 5. CONCLUSIONS

- SME businesses are subject to a higher operating risk due to their weaker positioning in relation to the market;
- Fixed costs and variable cost margins, as well as their proportion, are basis for operational risk assessment to SME;
- The economic risk is as higher as the enterprise's business security interval ( $I_S$ ) is smaller and DOL is higher;
- To ensure an acceptable risk requires an appropriate proportion between fixed costs and variable cost margin according to relationship (6);
- One of the main levers in SME business management is the high flexibility of management and manufacturing which allows for quick decisions to correct the deviations found;
- The need for strategic changes often occurs and places the company in a risky position in terms of financial result, which can lead to insolvency, in the worst scenario;
- The proposed decision model significantly diminishes economic risk by establishing decision-making milestones based on both the capitalization of market opportunities and the preservation of economic risk;
- The decision model allows the choice of the most appropriate strategic alternative for the implementation of a strategic plan;
- The decision model allows the correct evaluation of the economic result according to the assumed economic risk and establishes, through the variables involved, optimization solutions of the strategic plan; By the small number of variables and especially by their high significance, the decisional model is a practical and useful tool in SME management.

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