DIAGNOSE OF TECHNICAL RESOURCES
OF SMALL AND MIDLE SIZE ENTERPRISES (SME)

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Abstract: *The paper presents the main elements of technical resources diagnose as part of small enterprise resources analysis. Starting from general knowledge regarding technical resources, its diagnose objectives and specific demand for small and middle size enterprises, the paper synthesizes a model to be used in diagnose analysis process. According to this model, we establish a specific method of evaluation for the four topics of analysis: economic assets, fixes assets, production capacity and intangible assets. For each of these we have tables with the main financial indicators.*
A scoring evaluation method is associated to this diagnose model in order to facilitate setting the business level in accordance to technical resources criterion. The score function with variables, coefficients and the main coordinates of their choice is also presented.
Following the diagnose score, the business level is established and we suggest the main methods of improvement regarding technical resources.
Finally, the paper presents a case study of a company in the field of production, assessing the business rate and setting the main conclusions following diagnose. We added the tables containing values of indicators for three of the four topics and also the justification for the choice of coefficients significance and conventional score assigned for each domain of analysis.
The main conclusions regarding the case study are closing the paper.

Key words: *technical resources, diagnose analysis, fixed assets, production capacity, intangible assets, assessment, depreciation, equipments.*

1. INTRODUCTION

Diagnose, in economic perspective, is a process of knowledge, to help decision, a set of means that facilitate representation and interpretation of reality and a source of change [1]. Knowledge, in diagnose terms is both understanding phenomena and their explanation in the context of enterprise skills [3].

Models in diagnose analysis are concepts established by experts regarding the functioning of the organization like how this is structured in components and the relationships established between these and also the information system necessary to highlight the organization's strengths and dysfunctions [9].

In our opinion models in diagnose are communication ways between enterprise and experts designed to facilitate the knowledge of company and to increase the efficiency of improvement plans. A model allows experts to express a qualified opinion about the state of analyzed phenomena, based on dates collected and evaluated trough specific methods (Fig. 1.).

Diagnose, as a method of economic analysis, assumes to identify the key variables of state and dynamic phe-

nomena, to study their interaction in order to determine enterprise's objectives of progress [4].

The competitive potential of a company results from the manner of articulation of business strategic position, available resources and the quality of their worth [11].

To avoid confusions, we mention from the beginning the importance to understand resources as enterprise assets with a potential use in the business [11].
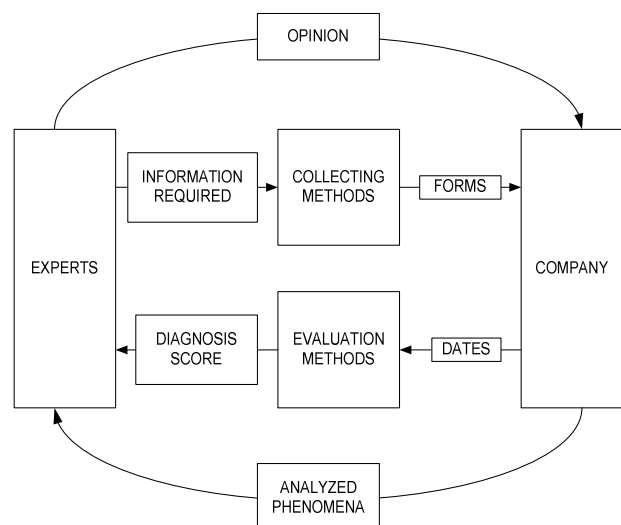

Fig. 1. Model diagnose.

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Technical resources are represented by tangible and intangible assets as part of enterprise economical heritage.

A tangible asset is owned in order to be used in manufacturing process and services, to be loaned or for administrative purpose and is expected to participate in multiple period cycles [10]. A tangible asset has material structure and with some exceptions it is exhaustible and subject to depreciation.

Intangible assets (trademarks, patents, licenses) assure enterprise possibilities in order to obtain benefits.

From our point of view, the diagnose of technical resources include both: knowledge of the enterprises' technical patrimony, represented by available assets and evaluation of their statement relative to enterprises present and also the future strategical activities.

This allows managers to take the best decisions to improve the balance between necessary and existed technical resources.

According to specialists the diagnose of technical resources has the following main objectives [4]:

- evaluation of assets joint to all activities or specific to each activity;
- evaluation of assets production/distribution capacity and their degree of use;
- assessing the structure and the condition of assets in use;
- assessing the enterprise's capacity of change and to value available resources;
- anticipating the capacity to generate future economic benefits.

To SME the technical resources are not the most important resources but they sure can increase the business competitiveness especially to production and commercial activities but also to services such as buildings, transport or tourism. Technical resources specific elements to SME are: lower share in economical heritage, high share in total resources of tangible assets versus intangible assets, high importance of intangible assets if they exist, concentration around the main activities (operating activities), determinant character of production capacity on technical resources level, low level of financial assets and investments [2].

Following these specific items, the evaluation method of technical resources to SME comprises four domains: analysis of economical asset, analysis of fixed assets, analysis of production capacity and analysis of intangible assets.

2. DESCRIPTION OF METHOD

The proposed method for assessing technical resources is based on the type of financial indicators and those evaluations are done through a scoring function.

In financial analysis, a score function represents a combination of financial indicators whose value, for a given company, allows predicting the risk of business [12]. In most of the cases, scoring functions is determined empirically to compare samples of companies. The result is a linear function of indicators using coefficients empirically determined through statistic tests that calculate a static value assimilated to the diagnose score.

Using these functions has the advantage of high objectivity of evaluation and involvement of specialists is reduced but takes not account of dynamics and specifics of the business.

Our method requires a high involvement of specialists in diagnose process that should determine both coefficients and values variables, based on specifics of business, values and dynamics of indicators. The score function allowss us to calculate a diagnosis score $\overline{DRT}$:

$$\overline{DRT} = \frac{\sum_{i=1}^{4} P_{rt_i} \cdot c_i}{\sum_{i=1}^{4} c_i}. \tag{1}$$

P_{rt_i} is a conventional score assigned for each domain of analysis. Its value represents the state of domains increasing on a scale of five steps between total inadaptability and perfect adaptation.

c_i is the coefficients' significance of domains. Its value, specific to each company, is given by experts, based on the level of significance in business, according to Table 1 [8].

According to the values of $\overline{DRT}$ experts set the business level according to the technical resources criterion and the improvement plan as in Table 2.

Table 1

Coefficients' significance of domains

Level of significance	Consequences of mismatch on enterprise activities	Value
Very high	Grave, at the level of whole activities	5
Major	Grave, at the level of single activity	2
Secondary	Isolated	1

Table 2

Conclusions following diagnose

$\overline{DRT}$	Business level	Improvement plan elements
0..1	Non adaptation	Stop the activity, selling inappropriate assets, change business profile.
1..2	Adaptation insufficiency	Restricting activity, significant restructuring activities or new business plan according to existing resources.
2..3	Adaptation to limit	Change technology, infusion of capital, important investments in technical resources including intangible assets.
3..4	Adaptation good	Increasing the level of use or efficiency of technical resources, access new technical resources
4..5	Adaptation very good	Business development or sell

3. ANALYSIS OF ECONOMICAL ASSET

In our opinion, to small and middle size enterprises the most relevant indicator is the net economic asset (Aen) that is bound to operating assets without taking into account short term financial investments. So, the economic assets contain intangible and tangible assets at net value (without depreciation), financial assets from the operating activity and the productive capital or the necessary working capital, as presented in Fig. 2 [2].

The proposed method achieves a financial perspective of economical assets using both indicators of dynamic and structure and efficiency as presented in Table 3. Indicators are followed over a period of less two years.

Company's economic assets are perfectly adapted to strategic activities if all indicators are increasing in the last two years of evaluation. Situations correspond to 5 conventional points assigned to domain. If indicators are falling down, a lower score, up to 1 point is assigned.
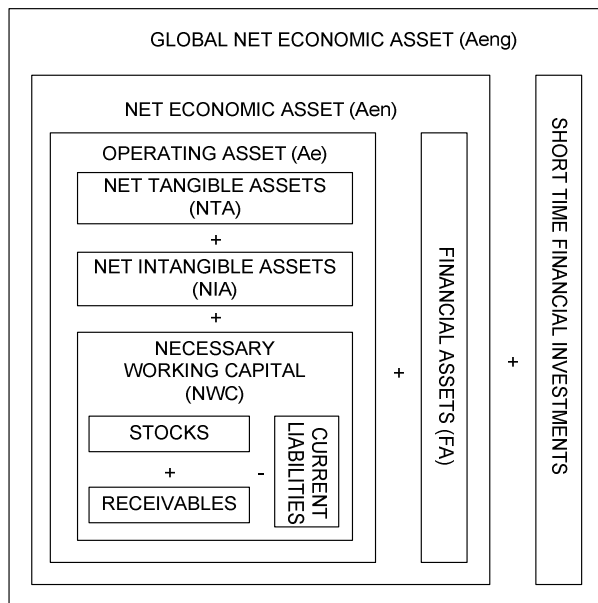

Fig. 2. Structure of economic assets.

Table 3

Indicators of economic asset

Indicators	Determination
Net sales turnover (CA)	According to statement of income and expenses
Net value added (VA)	According to statement of income and expenses
Operating result (RE)	According to statement of income and expenses
Operating asset	$Ae = NTA + NIA + NWC$
Net economic asset	$Aen = Ae + FA$
Rotation rate of turnover	$R_{CA} = \dfrac{CA}{Aen}$
Rate of value added	$R_{VA} = \dfrac{VA}{Aen}$
Rate of operating result	$R_{RE} = \dfrac{RE}{Aen}$

4. ANALYSIS OF FIXED ASSETS

Fixed assets are internal resources of the enterprise with historical cost and depreciated value, whose usage generates future benefits.

The method of evaluation of fixed assets takes account of the following particularities in SME [2]:

- net value relatively low, due to generally low level of investments in SME;
- market value uncertainty, determined by different means of acquisition: rent, donation, custody;
- good condition, although aging, due to enterprise concerns to maintenance, upgrading and remedial and not replacement;
- high dynamics caused by the frequent changes in production;
- low diversified and specialized structure, mostly universal fixed assets or with multiple accessories;

This method is comparative one and is based on indicators. Comparison is made between the existing level and a reference level, which may be the competitor's level, when true information about it is available or the target level of strategic objectives. The analysis covers a period for at least two financial years.

The indicators used in analysis are established depending on the importance of fixed assets in enterprise activity, the legal requirements and budget analysis. A portfolio of indicators is submitted in Table 4 [2].

Table 4

Indicators of fixed asset [2]

Indicators	Determination	Details
Fixed assets at net value	$MF = V_i - A$	V_i = value of purchase A = depreciation
Trend of change	$R_m = \dfrac{MF_1 - MF_0}{MF_0} \cdot$	$MF_0 = MF$ in the reference period $MF_1 =$ in the analysed period
Coefficient of renewal	$K_r = \dfrac{I_{MF}}{MF} \cdot 100$	I_{MF} = new entries in analysed period
Coefficient of active fixed assets	$K_a = \dfrac{MF_a}{MF} \cdot 100$	$MF_a = MF$ in use
Rate of depreciation	$K_u = \dfrac{A}{MF + A} \cdot 100$	
Rate of improvement	$K_m = \dfrac{MF_m}{MF} \cdot 100$	$MF_m =$ value of MF improved
Rate of turnover to MF	$E_{CA} = \dfrac{CA}{MF}$	CA = turnover
Rate of benefit to MF	$E_P = \dfrac{RE}{MF}$	RE = operating result
Coefficient of manufacturing equipment	$E_s = \dfrac{MF_{exp}}{N_p}$	MF_{exp} = value of manufacturing equipment N_p = number of employees

A company of 5 points, according to the method, has performing fixed assets (E_{CA}, E_P, E_s, increasing in the last two years), appropriate to activity (K_a, K_r increasing in the last two years) and normally depreciated ($K_u < 50\%$).

A total misfit company, with a diagnose score 1, has non-competitive fixed assets (E_{CA}, E_P, E_s, decreasing in the last two years), is depreciated ($K_u > 70\%$, K_m, $K_r < 30\%$) and does not meet the needs ($K_a < 50\%$).

5. ANALYSIS OF PRODUCTION CAPACITY

The production capacity in terms of diagnose analysis is a potential indicator which can be defined and calculated for all kind of activities including commercial (sales capacity) or services.

Specific elements to small and medium enterprises in terms of production capacity are:

- lower level than big enterprises;

- generally higher degree of use;

- high degree of use at the equipments level and low at the working time;

- high efficiency following the higher efficiency of management.

The group of indicators we recommend for enterprises in manufacturing fields is presented in Table 5. Following the specifics of the company one of these indicators can be adapted, completed or removed from the evaluation as to improve the significance of the group.

Based on the significance of the indicator a diagnose score is assigned to production capacity. A company is very well adapted and receives a diagnose score of 5 if it

Table 5

Indicators of production capacity [5]

Indicators	Determination	Details
Maximum production capacity	$C_{\max} = \sum C_{i\max}$	$C_{i\max}$ = max. capacity of "i" product
Degree of working time use	$G_{wt} = \dfrac{T_l}{T_{\max}}$	T_l = working time $T_{\max}$ = max. working time
Degree of equipments installed	$G_i = \dfrac{U_i}{U_e} \cdot 100$	U_i = number of equipments installed U_e = number of equipments
Degree of equipments in operation	$G_f = \dfrac{U_f}{U_i} \cdot 100$	U_f = number of equipments in operation
Degree of equipments in use	$G_F = \dfrac{U_f}{U_e} \cdot 100$	
Total production	According to production statements	Q_e
Degree of use production capacity	$G_{CP} = \dfrac{Q_e}{C_{\max}} \cdot 100$	
Average production capacity efficiency	$R = \dfrac{Q_e}{U_f}$	

uses its full available production capacity (G_i, G_f, $G_F > 90\%$) with maximum efficiency (G_{wt}, $G_{CP} > 100\%$) and good dynamic (R is increasing). At the opposite sit the companies that use insufficiently the available production capacity (G_i, G_f, $G_F < 30\%$) with low efficiency (G_{wt}, $G_{CP} < 20\%$) and dynamic (R is decreasing). These companies will receive a1 diagnose score.

6. ANALYSIS OF INTANGIBLE ASSETS

Intangible assets bring to enterprises advantages especially in high competitive areas in which discrimination is less on account of resources.

Intangible assets are less present in the SME as a result of the high cost of those acquisitions. However, companies that hold such assets have important levers for strengthening some competitive advantages and their economic development, especially in the globalization trend of world economy.

The main objectives of diagnose analysis to intangible assets domain, are:
- assess their competitive potential;
- assess their efficiency (cost / benefit);
- evaluate the contribution to company's heritage assessment (goodwill).

Diagnose analysis of this type of asset has difficulties mainly on evaluating benefits. For SME, we propose calculating the benefit by determining the usage value conferring maximum return on investment. For example a method is the one based on income which assesses both the usage value as part of the business as well as cash flow. This method can be used with enough precision in SME where we find independent indicators that do not cumulate effects of several intangible assets. Some analysis indicators used with the income method are presented in Table 6.

According to indicator values and trend, a company is scored with 5 points if intangible assets have a competitive potential (Sp, $Gw > 0$) and are efficiently exploited (Sp and Gw have increasing trends in the last two years).

Table 6

Indicators of intangible assets [6]

Indicators	Determination	Details
Corrected net assets	$ANC = A_t - D_t$ [1]	A_t = total assets D_t = total debts
Net profit	According to balance sheet	Pn
Capacity benefit	According to corrected balance sheet [2]	CB
Plus profit	$Sp = CB - ANC \cdot i$ [3]	I = capitalization rate
Goodwill	$Gw = Sp\,(1+i)^n$	n = number of years

[1] fictitious asset (patents, licenses, trademarks) are taken with zero value;

[2] corrected balance sheets include adjustments made to dispose the net profits to incidents of taxation, accounting methodology, and other distortions voluntary in order to obtain a reproducible result in future (CB);

[3] plus profit obtained only if the return is higher than resulting from the placement of equivalent capital on the financial market with corrected net assets.

If intangible assets are missing or are non-competitive, they do not create added value (Sp, $Gw > 0$) and the company is scored with a 1 diagnose point.

7. CASE STUDY

Case study refers to a SME operating in the field of production. Company's main activity is production of plastics packaging and it achieved 50% of its turnover. But this company has other secondary activities such as water bottling, commercials and renting.

The diagnose is focused on the main activity using three fixed assets and three employees. During the analyzed period, company had no fixed assets, new entries or exits.

Company has no intangible assets even if part of the competition uses such assets as competitive levers.

Considering this, coefficients' significance of domains is as follows:
- economic assets, $c_1 = 5$;
- fixed assets, $c_2 = 2$;
- production capacity, $c_3 = 2$;
- intangible assets, $c_4 = 1$.

The analysis was made by two experts during five days of work that include model design and conclusions.

Tables 7, 8 and 9 present the values of indicators and their trend for three of the four domains of analysis followed over in two successive years.

According to the results for the activity as analyzed according to our diagnose method, this company is scored as follows:
- economic assets, $P_{rt1} = 3$
  - technical resources are undersized compared to the level of activity of enterprise (Ae, Aen, down) as a result of depreciation of existing fixed assets and increasing volume of activity (NWC, down);
  - efficient use of technical resources in terms of lack of technical investments in 2010 (RCA, RVA, RRE, up);

- fixed assets, $P_{rt2} = 3$
  - fixed assets are all in use ($K_a = 100\%$) and meet performance (E_{CA}, E_P, up);
  - depreciation is high ($K_u > 70\%$);
  - technical level of fixed assets is declining (E_s, down);
- production capacity, $P_{rt3} = 4$
  - company uses its full available production capacity (G_i, G_f, $G_F = 100\%$);
  - high efficiency of the working time ($G_{wt} > 90\%$);
  - low efficiency of production capacity ($G_{CP} < 70\%$) but increasing (G_{CP}, R, up);
- intangible assets, $P_{rt4} = 1$
  - intangible assets are totally missing.

Diagnose score of technical resources computed with equation (1), is:

Table 8

Analysis of fixed asset

Indicators	2009	2010	%
Total fixed assets at net value	18300	6586	36
Active fixed assets	18300	6586	36
Manufacturing fixed assets	14158	4187	30
Turnover (CA)	311142	339551	109
Operating result (RE)	5302	12719	240
Number of employees (N_p)	3	3	100
Trend of change [%]	-	-64	-
Depreciation (A)	122718	132782	108
Coefficient of active fixed assets (K_a)	100	100	100
Rate of depreciation (K_u)	87	95	109
Rate of turnover to MF (E_{CA})	17	52	306
Rate of benefit to MF (E_P)	0.29	1.93	665
Coefficient of manufacturing Equipment (E_s)	4719	1396	30

Table 7

Analysis of economic asset

Indicators	2009	2010	%
Net intangible assets	0	0	-
Net fixed assets	18300	6586	36
Net financial assets	0	0	-
Stocks	44059	35268	80
Receivables	30597	26560	87
Current liabilities	12498	33246	266
Turnover (CA)	311142	339551	109
Value added (VA)	60537	62815	104
Operating result (RE)	5302	12719	240
Necessary working capital (NWC)	62158	26582	43
Operating asset (Ae)	80458	33168	41
Net economic asset (Aen)	80458	33168	41
Rotation rate of turnover (R_{CA})	3.87	10.24	264
Rate of value added (RVA)	0.75	1.89	252
Rate of operating result (RRE)	0.07	0.38	543

Table 9

Analysis of production capacity

Indicators	2009	2010	%
Maximum production capacity (C_{max})	1125000	1125000	100
Degree of working time use (G_{wt})	93	98	105
Degree of equipments installed (G_i)	100	100	100
Degree of equipments in operation (G_f)	100	100	100
Degree of equipments in use (G_F)	100	100	100
Total production (Q_e)	655033	789660	120
Degree of use production capacity (G_{CP})	58	70	120
Average production capacity efficiency (R)	218344	263220	120

$$\overline{DRT} = \frac{3\cdot5+2\cdot3+2\cdot4+1\cdot1}{5+2+2+1} = 3\,.$$

According to Table 2, the situation corresponds to adaptation to limit of the technical resources to needs. The main coordinates of the improvement plan are:

- investments in technical resources including intangible assets, in order to increase economic assets;
- intangible assets must provide plus profit under the conditions of Table 6;
- replacement or improvement of depreciated fixed assets to increase production capacity.

8. CONCLUSIONS

In the case study we develop a situation where there were doubts about the efficient use of technical resources in the production activity. The analysis was hampered by the fact that production activity shared a part of technical resources with secondary activities. Moreover, their profitability could hide the lack of performance of production activity. Thus, the first problem in analysis was to assign the company's results on each activity. In this sense we use different methods of sharing common resources as a method of percentage rates and a method of supplementing in the classical form [7].

The second problem was to provide a more complete approach to the phenomena but without complicate analysis. For these reasons four domains of analysis where defined by default in the diagnose method of technical resources: economical asset, fixed assets, production capacity and intangible assets. Each one of these may affect more or less the diagnose, their weight in the result being determined by the value assigned to the coefficient of significance according to Table 1.

The third problem we had to solve was the short time available to analyze and drawing conclusions. This is a general request from the beneficiaries of diagnose. In this sense we chose to use a simple mathematic model to evaluate financial variables trends. That allows synthesizing the statement in one single diagnose score. There are two variables that determine the score: the conventional score assigned for each domain of analysis, P_{r_i} and the coefficients significance of domains, c_i.

P_{r_i} is assigned by experts based on the evolution of a group of indicators established for each domain of analyse depending on its specific activity. In Tables 3, 4, 5 and 6 we presented the groups of indicators generally recommended in SME's diagnose for the four domains of analysis. Rating scale used to domain conventional score has five steps.

Following a five star evaluation model for private and autonomous administrations companies [8] we apply a specific method to SME's technical resources diagnose. Using conventional score and coefficients of significance assigned for each domain, this method aggregates a diagnose score $\overline{DRT}$, according to equation (1), whose value is between 1 and 5. Based on this value experts can assign a rating to business in terms of technical resources between "non adaptation" and "adaptation very good".

Finally, our method sets the main coordinates of the improvement plan (Table 2).

The proposed method is neither exhaustive nor exclusive to all SME. According to specifics of the evaluated company and the available budget for analysis, experts can improve or simplify the method by taking into account a larger or smaller number of domains and indicators. The main goal of the method is to plan and coordinate diagnose as to avoid any omissions with significant influence on phenomenon.

Our method as described allows obtaining the correct diagnose in terms of time and budget limits. To the presented case study we estimated the reducing of time with 50% and the budget with 30%.

As future developments of research in the field of diagnose of technical resources, we mention:

- designing specialized models for the main specific activities to SME: commercial, tourism, transports, buildings;
- designing specific forms to facilitate data collection;
- based on experts experience, development of specific guidelines to evaluate results and assigning the conventional diagnose score in terms of high objectivity;
- training experts in communication field with companies to improve quality of collected dates and to facilitate the implementation of improvements plans.

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