MONITORING DECISIONS IN SMALL AND MEDIUM SIZED ENTERPRISES USING KEY PERFORMANCE INDICATORS

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Abstract: *A key component of many decisions support tools in engineering and in other sciences is information. Monitoring is the process of collecting, analyzing and using information to guide management decisions in SMEs. Therefore, in a global context, it is necessary to identify proper indicators in supporting the decision – making process.*
The paper shows the impact of the KPIs selection for monitoring decisions to guarantee high performance of SMEs and to ensure long – term success.

Keywords: *KPIs- key performance indicators, SMEs - small and medium sized enterprises, decisions, performance, quality*

1. Introduction

Nowadays, the rationality of decisions has changed due to the evolutions of technologies. In SMEs monitoring decisions is both a crucial and a challenging task because many decisions are still made based on experience and intuition rather than on evidence supported by rigorous approaches. The cause for which a lot of decisions are often made this way is lack of data, conflicting goals, unknown relationships between data and goals, poorly understood risk.

2. Research methodology: monitoring decisions in SMEs using KPIs

Small and medium-sized enterprises (SMEs) differ in maturity and management style, ownership structure, location [8], performance and they benefit from past experience [1].

In management processes, indicators are managers'best friends, because they measure the difference between the desired situation (goal) and the current situation (result) [2], [5], [10].
Some challenges for SMEs include from the external perspective governmental [11], procedural, environmental and task issues and from the internal viewpoint functionality (understanding the customers, developing services, products and a succession plan, updating technology [16], determining location of business [8]) and marketing. A balance between both types of challenges will only make SMEs stronger, can created the opportunity to maximize their productivity, to being the leaders of innovativeness and flexibility or, in some cases, to takes intelligence to survive.

Key performance indicators (KPIs) are a set of performance measurements that demonstrate how effectively the SMEs are achieving key objectives [2], [3], [4], [22]. They quantify the success of a business process or activity.

KPIs characteristics are:
- *relevant and consistent* with the specific SMEs vision, strategy and objectives [14];
- *specific* – clear and focused to avoid misinterpretation or ambiguity;
- *measurable* – can be quantified/measured and may be either quantitative or qualitative [12];
- *representative* – appropriate to the SME together with its operational performance;
- *realistic* – fits into the SMEs constraints and cost effective;

- *attainable* – requires targets to be set that are observable, achievable, reasonable and credible under expected conditions as well as independently validated;
- *timely* – achievable within the given timeframe [15];
- *understood* – individuals and groups know how their behaviours and activities contribute to overall SMEs goals;
- *governed* – accountability and responsibility are defined and understood;
- *focused* on SME wide strategic value rather than non-critical local business outcomes – selection of the wrong KPI can result in counterproductive behaviour and sub optimised outcomes;

- *used to identify trends* – changes are infrequent, may be compared to other data over a reasonably long time and trends can be identified;
- *reported* – regular reports are made available to all stakeholders and contributors;
- *agreed* – all contributors agree and share responsibility within the SME;
- and *resourced* – the program is cost effective and adequately resourced throughout its lifetime.

There are many KPIs of SMEs to choose from [5], [6], [9], [13], [22] tab. 1:

Table 1. KPIs

KPIs				
Client satisfaction	Benefit	Management	Efficiently	Cost performance
Employee satisfaction	Profitability	Staff experience	Efficiency of labor	Schedule performance
Client changes	Stability	Team performance	Effectiveness	Percentage of product defects
Number of new customers	Growth	Human resource training and development	Accident	Innovation
Customer commitment	Development	Number of high-performance professionals	Contractor experience	Sustainability
Predictability – time, cost	Informatization	Motivation	Communication	Project management
Scope	Business performance	Salary competitiveness ratio	Environment	Stakeholders
Impact on society	Technological capability	Partnership and suppliers	Decision effectiveness	Changes
Organization competency	Risk	Policy or low of government	Safety and health	Sales by region
Planning period	Quality	Disputes	Productivity	Net promoter score

Quality KPIs are tools used to measure and monitor the SMEs performance. They have the function of measuring the final result by means of pre-established standards:

- efficiency indicator – productivity, it is responsible for measuring how many resources are needed to carry out production. It is possible to identify wastes that should be avoided and allow greater productivity;
- effectiveness indicator – value, help for understand the influence that what SMEs

offer has in the life of customers. Customers are the business thermometer;

- safety indicator – quality, the indicator is essential as it regards the effect SMEs has on the health or physical integrity of customers.

Quality KPIs can be diversified, they are among the principal types of process performance indicators. To drive the desired results for SMEs to satisfy customers, quality indicators improve service quality, produce

improvements, make better use of resources, obtain information to aid decision making [17], carry out appropriate planning. Today, as more customers leverage social networking to share their displeasure, quality KPIs should be high on the priority list.

Too many KPIs can lead to difficulty in data interpretation and making the understanding and managing of changes in performance more difficult [7]. It needs to reduce a large number of KPIs down to a more practical and useable number, because this enables to save time and resources during analysis and selection of metrics [Fig.1]. KPIs are powerful tools in management process, are quantifiable measurements that reflect the critical success factors of a business. When set up correctly, they identify the actions and activities to correct or to improve results. The amount of different available metrics provides difficulties to make right decisions [18].
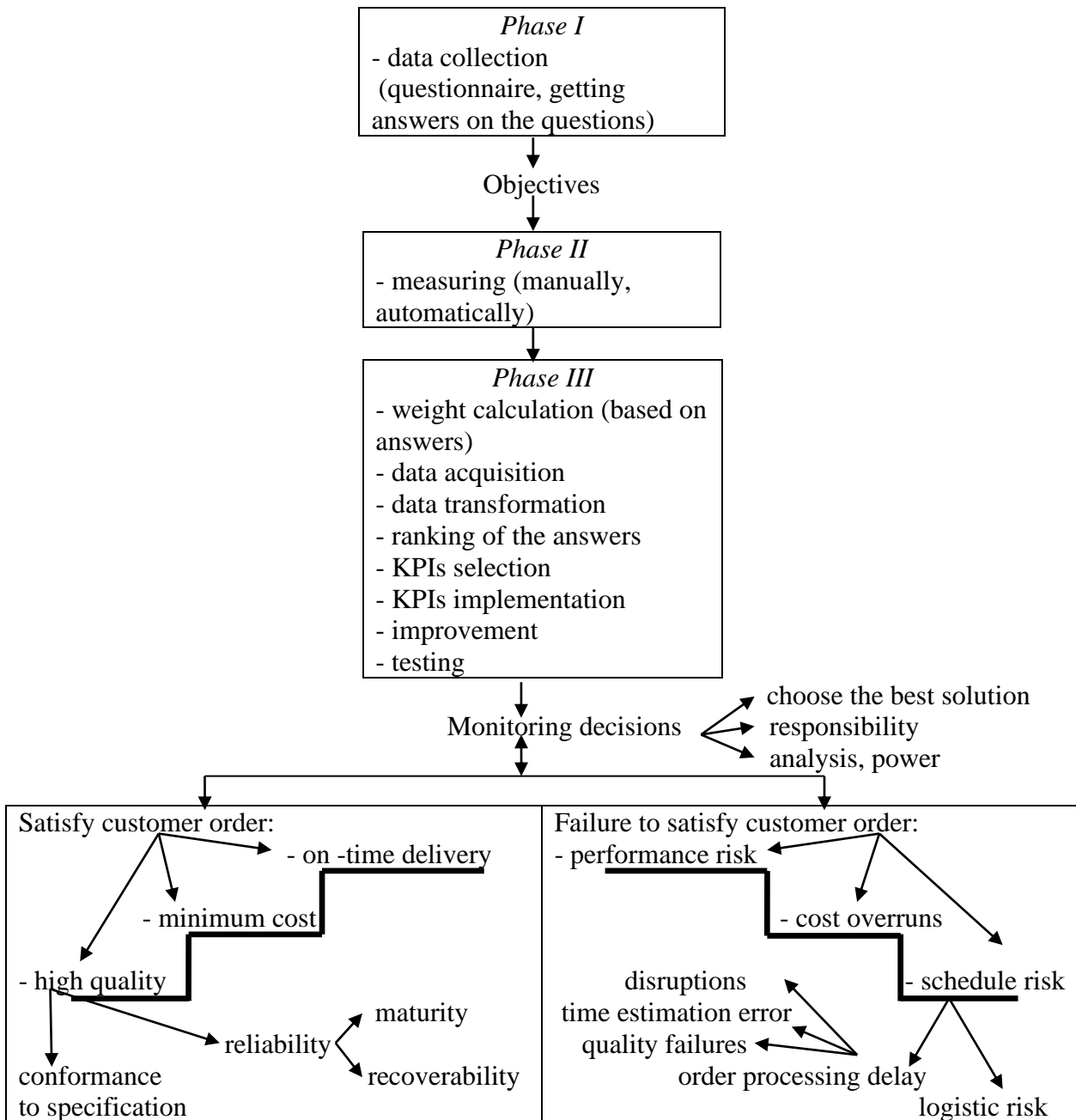
Phase I
- data collection
 (questionnaire, getting answers on the questions)

Objectives

Phase II
- measuring (manually, automatically)

Phase III
- weight calculation (based on answers)
- data acquisition
- data transformation
- ranking of the answers
- KPIs selection
- KPIs implementation
- improvement
- testing

Monitoring decisions → choose the best solution / responsibility / analysis, power

Satisfy customer order:
- on -time delivery
- minimum cost
- high quality
conformance to specification
reliability
maturity
recoverability

Failure to satisfy customer order:
- performance risk
- cost overruns
- schedule risk
disruptions
time estimation error
quality failures
order processing delay
logistic risk

Figure 1. *Phases of the model what reduce a large number of KPIs for monitoring decisions*

The data collection method can include questionnaires, surveys, interviews, sensor data collection, focus groups, automated machine data collection as well as collections of archival data. Some KPIs require data to be collected continuously, others specify hourly, daily, monthly, quarterly or annual collection. Measurement and data collection can be expensive and it is important to estimate the costs for collecting and monitoring an indicator and evaluate whether the costs are justified. Examples of KPIs for monitoring decisions in SMEs:

- *number of productive days/year*, % (for example, if the enterprise are small and had 10 employees and there only 35 days lost due to health because of SARS-COV2, the productive days in percentage would be 3300/3650=90,41%);

- *employee perception of management commitment* (this KPI is usually measured through regular surveys in enterprises. It is important to understand if employees feel that what they do on a daily basis and the management objectives are on the same path);

- *customer satisfaction* (is typically measured by customer responses to a very common survey question like "how satisfied were you with your experience?". Question is usually answered with a numbered scale);

- *customer engagement level*;

- *monthly website traffic*;

- *number of non-compliance events or incidents*;

- *cost performance index* (is calculated by dividing the earned value by the actual costs);

- *number of products sold* (this KPI depend on SMEs different store locations, in each period of time, by product type and by product category).

To monitoring a decision for improvement in a small enterprise, considering the following factors: impact on the SMEs, effect on public relation, impact on employees and organizational climate, cost, legality, collaborations, ethics of actions. I choose method Electre (Elimination et Choix Traduisant la Réalité, Bertrand Roy, [19]) and

I use this KPIs: KPI 1 - *employee perception of management commitment*, KPI 2 - *customer satisfaction*, KPI 3 - *customer engagement level*, KPI 4 - *number of high-performance professionals*. A small or a medium enterprise should be able to analyze each element of its strategy and business model in order to understand which factors influence sustainability. KPIs are a powerful means, which allow synthetizing complex and ample concepts into numerical terms, which drive the decision-making process.

- the matrix of qualifiers in a small enterprise includes 4 variants ant it needs to take correct decision for right variant:

$$M = \begin{array}{cccc} KPI\,1 & KPI\,2 & KPI\,3 & KPI\,4 \end{array}$$

$$M = \begin{pmatrix} G & VW & G & VW \\ VW & S & G & G \\ U & G & S & G \\ G & U & VW & G \end{pmatrix} \begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{matrix},$$

U - unsatisfactory,
S - satisfactorily,
G - good,
VW – very well,
$V_1 ... V_4$ – variants.

A decision matrix:

- is a series of values in columns and rows that allows to everybody to visually compare possible solutions by weighing their variables based on importance;

- aid SMEs in prioritizing tasks, problem – solving and crafting arguments to defend a decision already made.

- the grading scale:

	U	S	G	VW	Ratio
KPI 1	1	4	7	10	3
KPI 2	6	7	8	9	1
KPI 3	4	6	8	10	2
KPI 4	4	6	8	10	2

- the matrix of notes are:

$$\begin{array}{cccc} KPI1 & KPI2 & KPI3 & KPI\,4 \end{array}$$

$$M = \begin{pmatrix} 7 & 9 & 8 & 10 \\ 10 & 7 & 8 & 8 \\ 1 & 8 & 6 & 8 \\ 7 & 6 & 10 & 8 \end{pmatrix} \begin{matrix} V_1 \\ V_2 \\ V_3 \\ V_4 \end{matrix}, V – \text{variant},$$

- the vector of importance coefficients:

Z_j (j= 1,4)

$Z_4 = (0,4 \quad 0,3 \quad 0,2 \quad 0,1)$

$M_2=(D_{ij})$, i=1,4, j=1,4

$D_{ij}= Z_4*d_{ij}$

$$M_2 = \begin{pmatrix} 2.8 & 2.7 & 1.6 & 1 \\ 4 & 2.1 & 1.6 & 0.8 \\ 2.8 & 2.4 & 1.2 & 0.8 \\ 2.8 & 2.4 & 1.2 & 0.8 \end{pmatrix}$$

$Z_4 \quad (0.4 \quad 0.3 \quad 0.2 \quad 0.1)$

- concordance matrix:

$$M_C = \begin{pmatrix} y & 0.6 & 1 & 0.8 \\ 0.6 & y & 0.7 & 0.8 \\ 0 & 0.4 & y & 0.4 \\ 0.6 & 0.3 & 0.7 & y \end{pmatrix}, \text{ where}$$

$C_{(1,2)}=0.3+0.2+0.1=0.6$

$C_{(1,3)}=0.4+0.3+0.2+0.1=1$

$C_{(1,4)}=0.4+0.3+0.1=0.8$

$C_{(2,1)}=0.4+0.2+0.6=1,2$

$C_{(2,3)}=0.4+0.2+0.1=0,7$

$C_{(2,4)}=0.4+0.3+0.1=0,8$

$C_{(3,1)}=0$

$C_{(3,2)}=0.3+0.1=0,4$

$C_{(3,4)}=0.3+0.1=0,4$

$C_{(4,1)}=0.4+0.2=0,6$

$C_{(4,2)}=0.2+0.1=0,3$

$C_{(4,3)}=0.4+0.2+0.1=0,7$

- discordance matrix:

$$M_D = \begin{pmatrix} y & 0.33 & 0.05 & 0.05 \\ 0.16 & y & 0.08 & 0.08 \\ 0.66 & 1 & y & 0.66 \\ 0.11 & 0.33 & 0 & y \end{pmatrix}, \text{ where}$$

$h_m=3.6$, h_m – the difference between the highest grade and the lowest grade of the matrix

$D_{(1,2)}=1.2/3.6=0.33$

$D_{(1,3)}=2.4/3.6=0.66$

$D_{(1,4)}= 0.2/3.6=0.05$

$D_{(2,1)}= 0.6/3.6=0.16$

$D_{(2,3)}= 0.3/3.6=0.08$

$D_{(2,4)}= 0.3/3.6=0.08$

$D_{(3,1)}= 2.4/3.6=0.66$

$D_{(3,2)}= 3.6/3.6=1$

$D_{(3,4)}=2.4/3.6=0.66$

$D_{(4,1)}= 0.4/3.6=0.11$

$D_{(4,2)}=1.2/3.6=0.33$

$D_{(4,3)}= 0/3.6=0$

KPI1 KPI2 KPI3 KPI 4

- the final correction decision is: V_1 (G VW G VW).

KPIs guide and monitoring SMEs decisions, not make them for they. Making decisions is at the heart of running a business. It is absolutely fine for a single KPI to be trigger that a decision might need to be made about something, then other measures or KPIs can help guide that decision. KPIs are the steering force behind the strategic decision engine methdology, KPIs can be used to support a decision-making process.

Today, evidence on the COVID – 19 crisis impacts on SMEs from business surveys indicates severe disruption and concern among small businesses [20]. In the European Union, cumulative net revenue losses for companies in a 3 months lockdown scenario amount to 13-24% of GDP, with over half of firms facing liquidity shortfalls even after substantial policy intervention. SMEs face larger revenue losses than larger firms as a percentage of total assets (6-11% for SMEs, 2-4% for larger firms) [21].

While information on the increase in SMEs debt since the crisis outbreak is limited, early evidence suggests that crisis policy responses may have increased SMEs debt leverage significantly. Given the specific circumstances SMEs are currently facing, countries have put measures in place to support them. While the first concern is public health, a wide array of measures are being introduced to mitigate the economic impact of the coronavirus outbreak on businesses. Specifically, many countries are urgently deploying measures to support SMEs and the self-employed during this severely challenging time, with a strong focus on initiatives to sustain short-term liquidity. Such policies take various shapes. Some countries have focused on more general policies that have the potential to cushion the blow for the economy and for all businesses.

In a post – Covid 19 world, there are various impediments to the sector's SMEs growth, such as lack of formal finance, modern technology, unavailability of skilled workforce, and limited access to global markets. And they can only be overcome with the concerted efforts of government as well as financial institutions.

3. Conclusions

For monitoring a decision, managers can choose KPIs that meet specific performance goals of the SMEs (this may include customer performance, product developement, product usage or financial performance indicators). The need to make good decisions is never – ending in effective technology and business organizations. The periodic tracking (for example, daily, weekly, quarterly, annually) of any activity's SMEs progress by systematically gathering and analyzing data by KPIs and information is called monitoring. Manager can monitor 5 – 6 KPIs regularly and select others to monitor for specific situations.

KPIs can identify changes which might require an immediate change in business direction and should be used to celebrate success and identify risk.

The lack of KPIs leave a manager blind to what's going on and show a weakness in management style.

A decision matrix with KPIs evaluates and prioritizes a list of option and reduce subjectivity in decision making. The decision matrix is extremely useful for monitoring specifically when exist multiple decision criteria to consider (such as risk, as cost, customer value) with similar or varying levels of importance or many choices (like a different projects, features). Each outcome is assigned a utility value and the alternative with the highest total utility value wins the decision. The more objective and rational the decision matrix is filled, the better the decision should be.

Over time, conditions for SMEs will change and new information will emerge.

New information may be related to the facts-basis for decisions or to changing values for KPIs. One step in the decision process in SMEs is to identify mechanism for on – going monitoring to ensure accountability and research to improve the information base for future decisions and a review mechanism so that new information can be incorporated into future decisions.

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