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Implementation of key performance indicators selection model as part of the Enterprise Analysis Model

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Abstract

Nowadays, to be able to stay in competitive environment, organizations have come to the understanding, that monitoring of enterprise processes and factory floor is one of the ways to achieve better efficiency, performance and overview. As consequence of several frameworks, the methodologies has been proposed during last years. The companies are dealing with different key performance indicators (KPI), which help to focus on the parameters at that particular enterprise and are powerful tools in management processes. The real time monitoring systems for monitoring the KPIs will help companies to identify progress toward sales, marketing and customer service goals. However, the amount of different available metrics provides difficulties to make right decisions.

In the current study the Enterprise Analysis Model (EAM) with the results, obtained by applying KPI selection model as part of the EAM, were introduced. The model was tested in private company. The package of KPIs, which should be followed by management, was generated. The proposed method enables to save time and resources during analysis and selection of metrics.

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1. Introduction

Critical situation in the World economy (globalization, urbanization, fall of oil prices, restrictions from EU and Russian Federation on economic level) made companies to understand, that in order to be successful in dynamic environment with competitors, shorter product lifecycle and heavy price pressures, when costs are driving down by third party countries, they need to be agile, flexible and concentrate on their business strategy, which has moved from production or cost oriented ideology to more strategic orientation [1-6].

Within couple of last years, the enterprises were not only lack of the capital, but also trying to retain consumers as well. In order to achieve those goals, the company's performance should be at the high level: products or services should be made/provided at the right place, time, quantity and for right customer [7, 8].

The Key Performance indicators are the modern tools that help to keep the performance in the production on the high level [9, 10]. The possibility to discover and understand the bottlenecks, opportunity to evaluate the efficiency of workers and machines, setting higher goals and achieving them by moving straight forward is possible, when you are following and monitoring in real time the right metrics in your enterprise. Measurement of performance allows to make clear performance issues, compare current situation to the goals and to provide exact steps towards elimination of the problems [11, 12].

Kelvin has defined KPIs as "When you can measure what are speaking about and measure it in numbers, you know something about it, when you cannot express it in numbers, your knowledge is of meager and unsatisfactory kind; it may be the beginning of knowledge but you have scarcely, in your thoughts advanced to the stage of science" [13]. It is not exception that companies are measuring wrong metrics,

collecting the unnecessary information into databases and getting confidence that there is nothing to worry [14].

The successful metrics in one company could not always work on another, in spite of that that they are in the similar area. It's obvious, that the success of KPIs are depending on their continuous measurability [15]. Metrics should be adjusted to company's structures, production processes and internal/external data flows. That's why each management should follow their own KPIs and compare them with the competitors, on the right time and place [16]. Each indicator describes only a concrete sector and field of the company's activity. As a result, the packages of the successful indicators are required to be built by the management. Considering the number of different metrics and their impact on the enterprise's condition in total, management had been faced with the difficulties in selection of the right metrics on the right time [17].

In the current paper an attempt is made create a package of necessary metrics and implement the KPI selection model in particular private company based on this package of metrics [18, 19].

2. Enterprise Analysis Model (EAM) description

The Enterprise Analysis Model (EAM) is a tool, which allows performing analysis of the enterprise during reasonable time without remarkable lose in quality. The model helps to identify the weak spots of the company and provides the information regarding data, which should be collected for changing the situation in near future [18].

The EAM include questionnaire, based on analysis over 70 research papers covering production efficiency, design optimization of manufacturing processes, decision making, management and control etc. problems. Composing questions there is kept in mind that the answers should help to understand the situation in company and identify the bottlenecks. The questions are linked to KPIs, which means that by answering to questions, the right metric depending on the weight of the answer, will be selected. To eliminate the wrong answers each question has its own double (different formulation but the same meaning). The answer would be counted as "right" only when both answers are identical (to main question and its double) or there would be a little swing in scales (like strongly agree versus agree). The questions are grouped based on the position of the employee or in other words the specific package of questions was composed for particular job position in the company shop floor [17-20].

In order to use resources more effectively, design optimization of the EAM has been performed. As result of employing expert decisions and the outlier's methods the total number of KPIs was reduced. Three different outlier's detection methods have been employed: modified Z-score, Turkey's method and adjusted boxplot methods. These methods help to eliminate extreme values in the data. The data outside intervals determined by these methods are considered as outliers [21].

The start and final amount of questions and KPIs for study has been shown in Table 1 [20]:

Table 1. The amount of questions and KPIs for study

EAM	Raw	Optimized
Questions	259	61
KPIs	92	13

In addition, the EAM is a part of the KPI selection model and can be divided into next main phases:

- Data collection (getting answers on the questions);
- Data analysing;
- Weight calculation (based on answers);
- Ranking of the answers;
- KPIs selection;
- KPIs implementation;
- Data collection.

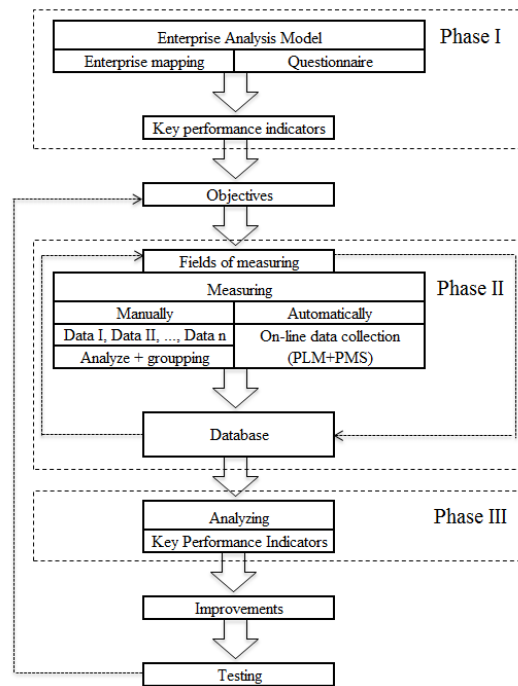


Fig.1. Main concept of the KPI model

In the Figure 1, the main concept of the model has been shown. The EAM model is located in phase and is been used for collecting information about company by applying mapping and questionnaire, which can be merged into one survey.

The whole process, shown in Fig.1 should be repeated continuously, as the situation is changing rapidly and requires monitoring of the whole manufacturing processes in the company.

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