Risk management in introducing the system for controlling glass container pressing procedures

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Abstract: - The key factor of success for the development of a project is risk identification, as well as the development of a risk management system. Risk management is a discipline which comprises methods and principles that are part of the lifecycle of a project. Successful realization of projects and their application greatly depend on the risk management.

The risk represents high probability that some kind of a problem will occur in the future. Due to complexity and the impossibility of controlling all the details, there is the possibility that something unexpected is going to happen. The risk is a reality that accompanies every event and does not cause damage in itself. The damage occurs in case we expose ourselves to risk. In that case the resulting damage is usually related only to its correction.

Companies should adapt and react fast to the variable market requirements and high risk, since they are constantly exposed to various types of risks. Risk usually accompanies every business and directly affects the result. Therefore, risk management is constantly necessary in an environment where the operating and business conditions change fast, in order to achieve the strategic advantages of a company.

The example of introducing a new monitor system in the process of pressing on glass-producing machines will be used to process the risks that occurred in connection with this project. For glass containers to be able to meet the market requirements, apart from a well designed container it is also necessary to achieve excellent distribution of glass (uniform wall thickness of the glass container), which can be realized through a production process, the so-called NNPB (Narrow Neck Press and Blow Process) [1]. In order to improve the production and raise the quality of the finished products, various systems are being introduced, one of which is also WISEPPC (Wireless Sensor Plunger Position Control) [2] of the system that monitors the pressing procedure on the glass-producing machines, and at the same time also the automatic regulation of the glass droplet mass.

Key-Words: risk management, methods for risk analysis, glass drop, Wireless Sensor Plunger Position Control WISEPPC, Narrow neck press and blow process NNPB

1 Introduction
Risk represents the possibility (potential) of a future negative reality, which makes risk management a dynamic process. Risk is determined by two significant negative possibilities in the future events: [3]

- probability of an event (whether something is going to happen or not), and
- consequences of the event (to what extent these will be catastrophic, should it happen).

Every project includes risk. In projects the losses may occur in several forms: reduced project quality, increased costs, exceeded deadlines, complete failure in achieving the objectives. Recognition and determining of the significance of single risks allows the project team to focus on the risk areas which affect the project. Adequate procedures to alleviate risk reduce the total risk of the project. Total project costs are reduced if the project is completed sooner than planned, and the methods are undertaken in order to reduce risk in realizing the project [4]. Projects which use the risk management process during their development have fewer unforeseen situations since the causes had been
identified (in many cases also eliminated) even before they occurred. [5]

2 The process of risk management
Risk management is a method used for identification and measuring of risks, and for the selection of development and introduction of options to calculate risk. Risk structure is divided into four interconnected elements: [4]

- risk planning (what, when, how);
- risk assessment (identification and analysis);
- risk response (alleviating risk);
- monitoring and reporting about the risk (information about the event).

Successful risk management means understanding of the risk and knowing the way of how to manage risk.

The risk management process (figure 1.) consists of the decisions and procedures that:

- estimate which risks might occur,
- define the procedures that need to be undertaken in order to alleviate risks.

A successful project team estimates the risks through the entire lifecycle of the project and uses these estimates to make decisions in all the phases of realizing the project. The project team analyzes the risks until they find their solution or the risks flow over into problems solved as such. [6]

Risk surveillance is a continuous process of monitoring and assessing the risk management process with reporting, action of the company in accordance with the elements of the surveillance audit and regular company reports on potential development risks.

The key of the surveillance process is the setting of the indicator system of cost management, scheduling and realization for the integral project, which can be used to assess the project status.

Probability and risk impact – The scales of probability and impact are used to assess the two crucial risk scopes: probabilities and consequences [3]. In case of frequent or repeating projects it is easier to forecast the probabilities of risk occurrence and their consequences, whereas complex projects usually include more uncertainties.

Checking project assumptions – Assumptions or opinions stated during the risk identification process are the potential risks.

Distribution of data regarding accuracy (credibility) – The accuracy of data describes the amount of knowledge and understanding of risks. This method is used to measure the quantity of available data and their credibility. Also, the source of data used for risk identification needs to be assessed.

General distribution of risk in a project – by distributing risks the general risk status of a project can be determined by comparing the data with other already existing assessed project risks [7]. They may be used to assign personnel and other resources to projects with various levels of risk, to make decisions in the project based on the cost-benefit analysis, or as support to the recommendation for the start, prolongation or cancellation of the project.

Priority list of risks – the risk and circumstances may be distributed according to various criteria, e.g. regarding level (high, moderate, low). They may also be classified in groups – namely, groups that require momentary reaction, and those that needn’t be taken into consideration immediately. Risks that affect costs, scheduling, feasibility and quality are assessed separately at various levels. In case of significant risks the description of the status is recommendable, which was the basis for the assessment of probability and impact. [8]

List of risks for further analysis and management –
risks classified as high or moderate ones are first on the list for the next analysis, together with the quantitative risk analysis and method of risk management. [9]

**Assessment matrix (level definition) of risk probability and impact** – Risk identification includes also activities which help in defining the probability or consequences of risk elements (figure 2):

- testing and analyzing the uncertainty,
- testing because of understanding the probability and consequences,
- activities that determine the value of risk volume, where a descriptive grade (high, moderate, low) is not sufficient for adequate understanding.

**3.1 Potential risks on the system for monitoring the process of pressing WISEPPC**

A system for monitoring the pressing on IS glass-producing machines WISEPPC on one production line in the plant has been installed in Vetropack Straža – a factory for the production of glass packaging. Since this meant the introduction of a completely new system on an entire glass-producing machine – the system had been first tested only on one section of the glass-producing machine in Germany, considering the following risks (figure 3):

- missions and objectives – whether the system will meet the expectations (regulation of glass droplet mass within 1 gram in the NNPB production process);
- employees – how will the employees accept this new system, considering it is a new system (if calibration and weighing control do not work, the system does not work properly);
- exceeding of planned costs – whether all the costs have been taken into consideration;
- technical risks – are any changes and modifications of the existing system necessary, if yes then which;
- management risks – drawbacks / failures in planning the system introduction;
- software risks – whether the system will provide good regulation of glass droplet mass;
- other resource risks – supply of spare parts – considering it is a new system;
- exceeding the time schedule – contract dependent customers.

![Figure 2. Risk matrix [6]](image)

![Legend: green – low risk, yellow – average risk, red – high risk](image)

Figure 3. Risk matrix in implementation of system WISEPPC

"**Low risks**": acceptance of the new system by the employees, drawbacks and failures in planning the system introduction, exceeding of the planned costs – need to be taken into consideration; however, these can be relatively simply solved.

"**Moderate risks**": production and finishing on the existing system, system software, mission and objectives of the system – close attention should be paid since their consequences are very unfavourable. Before installing the system minor modifications on the base plates and core mould mechanism pistons were made in order to be able to install probes and sensors. Software was also corrected, thus improving automatic regulation of the glass droplet mass, and adding also software for automatic rejection. This project of introducing the system for the monitor of the pressing procedure on IS machines WISEPPC met the expectations and thus also the “missions and objectives”, and until today only in our glass plant eight such systems have been installed.

Extremely close attention should be paid to "**high risks**": exceeding of plan schedules – some big customers require explicitly that some of the systems
for automatic regulation of glass droplet mass be installed, and if it is found that at a given moment the agreed conditions are not fulfilled, this may lead to loss of customers’ satisfaction and confidence, including the contract. In the present turbulent conditions and great uncertainty it may happen that parts for this system cannot be purchased thus rendering the very system operation impossible.

4 Conclusion
In the past practice, a large number of projects were completed without success. The reason for this, in the majority of cases was poor project risk assessment, both at the beginning and during the project realization.

Every development or plan requires a detailed risk analysis thus minimizing possible problems. It is also possible to turn the possible problems into possible opportunities and this has to be considered as well. In this case experience and events that occurred in previous projects play a very important role.

When assessing risk, mistakes have to be found. This means searching for the possibilities and ways of improving the situation for which the use of risk transformation method is the best, applying reliable and adequate possibilities.

It may happen that a minor risk project is abandoned due to a wrong assessment made by others, which means loss both because of what failed to be done and of what was postponed. Good risk assessment is very important, and should not be neglected along with other factors in making decisions on investments.

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