

## RISK – THREATS AND OPPORTUNITIES IN METALLURGICAL PRODUCTION

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The effective strategy ensuring the European metallurgical concerns a competitive position on the market must be based on the risk analysis and assessment, both connected with the influencing external and internal factors. In the study one has proposed the algorithm of systemic management with the risk of threats and opportunities, covering the risk value assessment with the application of the matrix method as well as the acceptability assessment based on the individual criteria. The developed methodology one has applied for the chosen factors representing the threats and possibilities for realizing the aims of the metallurgical processes. The comparison of the assessment results of both: risk connected with the threats and risk of possibilities, should be of systemic character and constitute the base for the decisions within the scope of risk taking actions.

*Keywords:* metallurgy, risk management, threats, opportunities

### INTRODUCTION

Most of the European steel mills is in the possession of the implemented and certified quality management system being in accordance with the ISO 9001 norm. The system in question requires from the mills taking up actions connected with the following [1]:

- risks, directed at elimination or limiting the effects of threats within the processes,
- opportunities, enabling processes improvement.

Risk can be described as a combination of the consequences of an event and the associated likelihood of occurrence or as “effect of uncertainty on objectives”. The effect can be both positive or negative [2,3].

In the sense of negative impact on the achievement of aims, it can be applied within the planning phase as the tool for minimizing the influence of threats, which will enable both: pointing “the problematic” processes as well as their monitoring by the identification and supervision over their key-parameters [4,5].

The opportunity can be interpreted as the result of the situation favouring achievement of the planned results understood as improvement, and may also refrain from the necessity of taking up threats [1,6,7].

The organization, while estimating the risk connected with the threats and opportunities should take into consideration the realized processes, requirements stated by the interested parties and – having the influence – factors from the technological, legal, market, social and cultural environments and having the various range of influence [1,8,9].

### METHODOLOGY

There does not exist the formalized requirement of the risk connected with the threats and opportunities management, any norm also does not point the concrete methods of their identification and the assessment. There can be a various interpretation of the opportunity, which may be perceived independently or as the effect of planning the actions connected with the threats. The systemic approach to the actions connected with the risk is a highly difficult task, which requires from the organization development and implementation of own procedure; it may cover the following (Fig. 1):

- taking advantage of the process approach,
- preparing the methodology for identifying and assessment of risk of threats and chances as well as their documentation,
- identification and assessment of risk of threats and chances as well as their documentation,
- planning and realization of the actions connected with identified threats and chances,
- assessment of the effectiveness of actions limiting the threats and taking advantage of the opportunities.

The threats have been defined as the factors which influence or may influence in a negative way on the process diminishing the probability of achieving the aims by it. The opportunities have been defined as the factors which influence or may influence in a positive way on the process boosting the probability of achieving the aims by it.

Within the analysis of threats and opportunities, the choice of the parameters undergoing the analysis is of the key-importance. The choice in question determines

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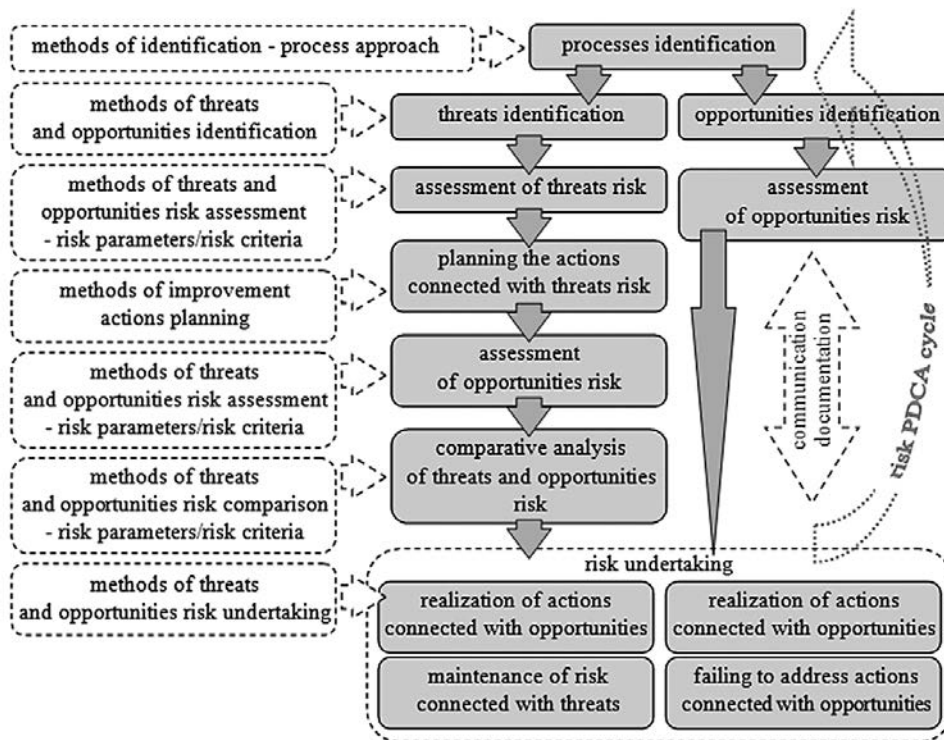


Figure 1 Algorithm of the systemic threats and opportunities risk management

the criteria of assessment, which should be of the individual character. Similarly, the way of risk value assessment is also depended on the decision presented by the organization. It is of high importance the assessment method to be repetitive in order to assure the comparison of the assessment results of the actions connected with the risk of threats and opportunities.

In the analysis concerning the risk one has taken into consideration two parameters – probability of results occurrence and their significance. Criteria of the results significance assessment for the 5-grades-scale have been used as follows: very small (1), small (2), moderate (3), big (4), very big (5).

One has calculated the value of risk based on the matrix method – Fig. 2. The most important phase of the risk connected with the threats’ and opportunities’ effects occurrence assessment is to estimate their acceptability. Based on the results, the decisions concerning the actions connected with the threats and opportunities will be taken up – Table 1.

RESULTS

The described methodology of the risk assessment connected with the threats and opportunities effects occurrence has been applied in the steel plant for processes with different aims – Table 2. Risk connected with the fruition of the exemplary threats results concerning the assurance of: balance within the raw material supply, constant production costs, reliable machines and devices, proper occupational structure and constant accessibility of the workers is in most cases unacceptable or requires being monitored.

Therefore, in each cases the risk requires taking up actions boosting the chance that the aims of the processes will be realized. The actions are of the character of new technical – technological and organizational solutions. The risk connected with their realization is, in most cases, small and the aim of the process will be obtained or moderate and the risk of opportunity must be monitored.

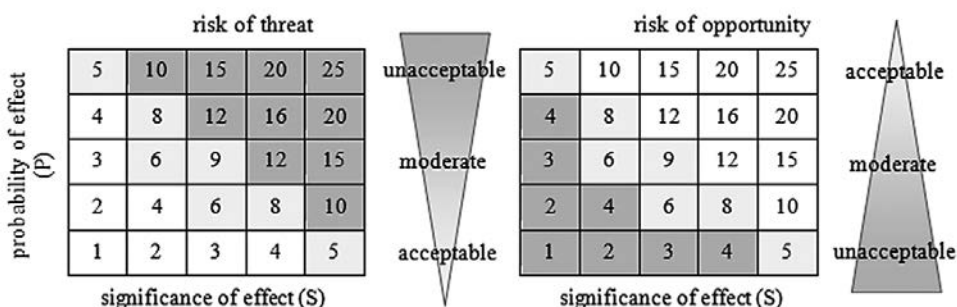


Figure 2 Matrix of risk for threats and opportunities assessment

Table 1 Risk acceptability criteria for threats and opportunities

Threats		Risk acceptability	Opportunities	
Acceptability criteria	Risk value		Risk value	Acceptability criteria
Risk is small; aim of the process will be achieved, actions minimizing the risk and diminishing the threats are unnecessary	1-4	acceptable	10-25	Risk is small; aim of the process will be achieved, other actions boosting the opportunities are unnecessary
Risk is moderate; aim of the process can be obtained conditionally, there is a necessity of risk monitoring and – if it is necessary – taking up actions minimizing risk and diminishing threat	5-9	moderate	5-9	Risk is moderate; aim of the process can be obtained, there is a necessity of risk monitoring and – if it is necessary – taking up other actions boosting the opportunities
Risk is high; aim of the process may not be obtained, there is a necessity of taking up actions minimizing risk	10-25	unacceptable	1-4	Risk is high; aim of the process will not be obtained, there is a necessity of taking up other actions boosting the opportunities

Table 2 Summary of the exemplary objectives, threats and opportunities and their risk values

Aim of process	Exemplary threats	Risk values - threats	Exemplary opportunities	Risk values - opportunities
Maintenance of competitiveness of the EU steel industry by keeping production costs constant	Rising prices of energy and CO <sub>2</sub> emission permissions	S = 4 P = 4 R = 16 Risk is unacceptable	Modernization focused on diminishing the production energy consumption and CO <sub>2</sub> emission	S = 4, P = 3, R = 12 Risk is small, acceptable
Maintenance of the UE steel production continuity by assurance of balance within the raw material supply	Strong relationship between raw material imports and raw material overall supply	S = 4 P = 4 R = 16 Risk is unacceptable	Metallurgical processes to produce raw materials from lower grade and more complex resources	S = 3 P = 2 R = 12 Risk is small, acceptable
Maintenance of processes technical continuity and stability by preventing machines and devices unreliability	Obsolescence and corrosion of machines and installations, lack of monitoring the machines and installations, lack of instructions of using them in the normal operation	S = 4 P = 2 R = 8 Risk is moderate, must be monitored	Purchase of the new machines and installations or their thorough modernization, monitoring of action, training for workers and instructions of using them in the normal operation	S = 4 P = 4 R = 16 Risk is small, acceptable
Maintenance of the labour productivity by assurance of proper occupational structure in the meaning of skills, knowledge and average age	Decreasing labour force both in the scope of number and experience, rising skills and knowledge requirements, high average age in the sector	S = 3 P = 4 R = 12 Risk is unacceptable	Attracting and maintaining highly skilled labour by choice of the workers, their motivation and development, departing from the conservative rules of the organization	S = 3 P = 2 R = 6 Risk is moderate, must be monitored
Ensuring the continuity of the operational processes by preventing the tenable lack of access of the bigger group of workers	Loss of the workers due to the falling ill or quarantine of huge number of the workers or even all the plant	S = 5 P = 2 R = 10 Risk is unacceptable	Prevention concerning falling ill, immediately taken actions aiming at minimizing the spread of illness among the workers	S = 5 P = 4 R = 20 Risk is small, acceptable

## CONCLUSIONS

The risk connected with the threats occurrence in the area of the metallurgical industry can be acceptable or unacceptable in the context of obtaining the aims by the realized processes. The unacceptable risk requires taking up actions connected with diminishing the probability of fruition of its negative effects. Such actions represent the opportunity that the aim of the process will be realized. It means that from the risk connected with the threats directly refrains the risk connected with the opportunity. Its size and acceptability show if it is worth taking up such actions.

The risk of threats and opportunities assessment is not an easy task. The results of risk assessment being realized with applying the presented methodology show that application of the generalised criteria of assessment allow solely for formulating – regardless the sort of proposed actions – conclusions representing the recom-

mended actions connected with the opportunities. Probably the risk parameter, which assessment would allow for the clear-cut confirmation of reasonability of the boosting actions, would be the costs refraining from the unattained aims due to the threats as well as the costs connected with taking advantage of the opportunities within the scope of preventive actions against the fruition of the threats effects.

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**Note:** The professional translator responsible for English language is Dominika Wnukowska, Katowice, Poland.