SIE 2015
6th International Symposium on Industrial Engineering
24th-25th September 2015
FACULTY OF MECHANICAL ENGINEERING
STEINBEIS ADVANCED RISK TECHNOLOGIES
INNOVATION CENTER FME

RISK MEASURING WITH RISK ANALYSIS AND RESPOND TOOLS

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Abstract. *Any risk influencing not only one but all subjects of supply chain, must be treated with maximum seriousness. This paper is about to present ways of risk measuring and analysis, in order to make best decisions considering supply chain, as well as risk responding strategies suitable for any kind of risk.*
Key words: *Production management, ABC method, Cost-benefit analysis.*

1.INTRODUCTION

In the supply chain, risk of one of the participants in the supply chain represents a risk for all its participants. Its effect is cumulative and therefore the small risks for each participant in the chain,may occur as a major problem for the supply chain.
The risk in supply chains can occur in all events related to the movement of materials and the consequences of risk occurring may be shown as prevented delivery, late delivery or damaged goods. However, this is only an initial effect - for example, delayed delivery of raw materials can halt production, increase costs when engaging alternative modes of transport, badly affect the business relationships between the partners in the chain and so on. To prevent all this and to , if not completely eliminate, then at least reduce risk to minimum, it is necessary to measure risk, analyze and properly respond to it. The paper gives an overview of the most effective ways to do so.

2. RISK MEASURING

There are a few ways of risk measuring [5], best of them is:
The quantitative way- which is based mostly on two factors:
1. Risk probability,
2. Risk consequences.
Using these factors, it is possible to calculate expected value and on its grounds to evaluate risk:

EV=P X C[1]

But: when it comes to the risks, consequences of risk do not exist until a certain event does not realize -the question is how to find the probability of risk events and how to find the real value of the consequence of an event (for example, direct costs and other not so easily measurable results, such as loss of reputation and similar unwanted results).
So: expected value can be useful as a tool for risk measuring and ranking, but not for real consequence assessment. Real consequence assessment is to be done in a similar manner as the determination of the probability:

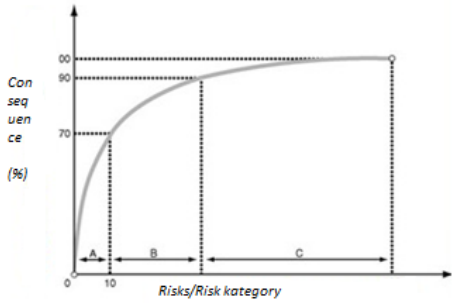
Intervals of values,
Description consequence, for example, categories:

K 1: Negligible (negligible effect on the supply chain);
K 2: Small (smaller disturbances, but the tool chain is not disturbed);
K 3: Medium (disorders that disrupt some functions in the chain, but the most important ones are still working normally);
K 4: Serious (major disturbances core activities in the chain);
K 5: Critical (cancel the whole chain at a time, but with the possibility of recovery);
K 6: Catastrophic (cancel the whole chain without the possibility of recovery).

Only when we predict consequence, it is possible to analyze risk, and to conduct risk ranking, and consequence prediction is shown in Picture 1:

[1]EV=expected value
P=probability
C=consequences

Risk category		Risk %	Consequence	%
A	10	10	70	70
B	20	30	20	90
C	70	100	10	100



Picture 1: Risk and consequence

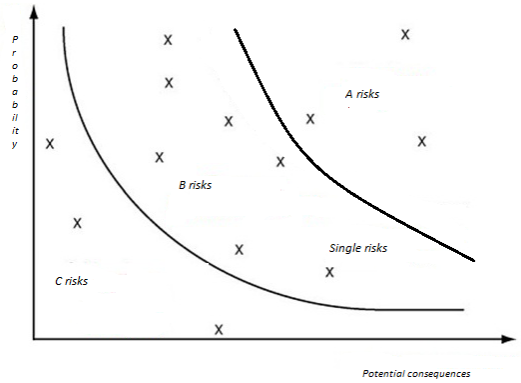
(at the top are the most important, at the bottom are of no significance)

Only then, risk classification (Picture 2) is done and it can be based on ABC (Pareto) analysis:

-A risks: high risk, special attention;

-B risks: average risks, normal attention;

-C risks: risks are small, little attention.



Picture 2: Pareto risk analysis

3. RISK ANALYSIS AND RESPOND TOOLS

Less than half of the companies surveyed have defined measures and risk assessment procedures. In order to better that, it is suggested to use some tools that help analyze risk and respond to it.

Common tools are:

-Failure mos and effects analysis

-Scenario analysis

-Simulation

-Network models

The big problem and a challenge is to choose the most appropriate response to identified risks [2]. There is a huge number of potential reactions. To overcome this, basic principle is used: the reaction depends on the magnitude of risks, mainly in terms of the potential consequences:

-C risks (unlikely, small effects) - ignore; react when the risk event is realized;

-B risks (higher probability serious consequences) - should change activities (to hold more reserves, adding reserves in time or capacity);

-A risks (the most serious risks), it is necessary to carefully consider responses.

Depending on a risk, different reactions are used. As a minimum, each reaction should provide:

-Normal operation of the supply chain (or with minimal interruptions);

-Effective risk management and efficient use of resources;

-Undisturbed implementation of regulations and rules.

Each reaction corresponds to different circumstances. In general, it is best to prevent the outbreak of risk events, then to reduce the size of consequence and eventually eliminate the consequences. "Walters" (2007) gives the following list of alternative reaction [3]:

1.Ignore or accept the risk (Using the risk register and risk-ranking managers can define the risks that will ignore those that will analyze in more detail).

2. Reduce the likelihood of risk events, for example take action to reduce the likeliness of risk and avoid activities where the risk can occur.

3. Minimize or limit the consequences, for example expected value: Take actions to reduce the likelihood of an outbreak of consequences (prevention: education, law, technical improvements) and as much as possible to reduce the consequences if the risk is realized.

4.Transfer, share, or avoid the risk [1]. methods:

Risk transfer - usually going from one member of the chain to the other, usually the one who is able to deal with the risk; it is used eliminate or reduce the risk, but in practice even this risk increases. The usual way: Insurance.

Risk sharing - depends on the relative power of the company (usually more powerful transfer of risk to the weak), attitude towards risk (acceptance or refusal of risk), control, expertise and experience.

5.Make contingency plans, (commonly known as "Plan B") [5] are applied after the realization of risks; Of course, these plans are prepared before the realization of risk event.

6.Adjust. Somewhat passive (reactive) response, as managers realize that the event is inevitable, so try to adapt activities to the new circumstances.

7.Fight the change. On shown change (for example, changing the law) the company can react to oppose changes: raising campaigns, forming support groups (pressure groups) and the like. This method rarely produces the desired results, and at a certain point the company should stop the opposition and begin adapting to the new conditions.

8.Move to a different environment. This is one of the most extreme option - means, for example, moving into new markets.

Options (strategies) [2], [4] which are the real ways to achieve the intended results, are:

- Adjust structure of the supply chain (shortening the horizontal structure and increasing the vertical chain structure, creating a parallel route for vehicles, the choice of several key suppliers, outsourcing);
- Diminish variability (grip performance values within the interval specification);
- Hold higher level of security stocks (raw materials, in order to protect the risk of the supplier, and finished products, in order to protect the risk of the user);
- Add spare capacity (operational equivalent to protective inventory; reserve capacity: a little more storage space, slightly larger number of vehicles in the fleet; it is common to incorporate a 10% excess capacity in acute cases);
- Increase agility (flexibility of the organization to adapt to change);
- Better planning and forecasting (use sophisticated methods for planning and forecasting and monitoring software);
- Increase cooperation between members of the chain (by applying various strategic alliances);
- Carefully evaluate suppliers (apply modern techniques for assessing the performance of the supplier);
- Produce according to orders;
- Apply the "make or buy" [3];
- Rationalize the product range;
- Implement binding contracts (contracts with penalties depending on performance);
- Use insurance.

The best reaction is one that ensures a free flow of materials through the supply chain thereby creating the lowest cost (or some other performance).

In order to gt to the optimal reaction, at this stage, it is necessary to use at least some of the method for decision support, such as system analysis or decision support tree.

4.CONCLUSION

With proper measurement, analysis and risk assessment, it is possible to predict the risk that a chain system can be exposed to. Proper and just-in-time reaction to the risk it is possible to respond to these dangers so that they should no longer be a threat to the functioning of the supply chain. All this contributes to more efficient operation of not just one but all the companies involved in the chain and as such, can be considered an important stage of deciding to which you should pay special attention and whose efficient performance can be crucial for business and financial efficiency of the company.

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