Fundamentals of Risk Management





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FUNDAMENTALS OF RISK MANAGEMENT



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1. INTRODUCTION

Each organisation has a "*mission*" and therefore, in absolutely general terms, it must address the problem of protecting itself against events that can place the pursuit of this fundamental objective "*at risk*" (*and, as a result, all of the preliminary intermediate objectives*). Risks, which are understood as "possible damage", are connected to situations of uncertainty, with possible negative evolution, to which every organisation is exposed in carrying out its business.

For a long period of time, companies faced different types of risks in a specific and unconnected manner; today, instead, there are methods of *"definition and control",* which are collected in a systematic approach known as *"Risk Management"*, which provides reasonable defence against the possible verification of harmful events.

Risk Management can therefore be defined as "a group of actions that are integrated within the wider context of a company organisation, which are directed toward assessing and measuring possible risk situations as well as elaborating the strategies necessary for managing them".

Obviously, *Risk Management* can be targeted toward all or only some of the *"different types of potential risk",* that is, the specific areas of possible uncertainty that affect the life of a company. Company risks are normally classified within three large categories:

- risks inherent to the external context (e.g.: emergence of unfavourable laws and/or regulations; negative changes to market conditions; technological innovations that favour competitors; etc.);
- risks inherent to operative management (e.g.: non compliance with contractual requirements; possible loss of market share; possible loss of skills; possible physical damage to personnel; possible environmental pollution; etc.);
- risks inherent to financial management (e.g.: difficulty in collecting accounts receivables; unfavourable changes in exchange rates; imbalances in liquidity; etc.).

Each of these risks may lead to *direct and/or indirect damage* to the organisation, with economic implications that may also be considerable in the short, medium and long term.

From this point of view, therefore, the attention given to *Risk Management*, in terms of the quality and quantity of allocated resources, must be congruent, not only with the type of considered risk,



but also with the concept of the *probability* with which a potential negative event could occur and the seriousness of its *consequences.*

A complete management of risks aims to protect, from all points of view:

- not only the value already created by the organisation;
- but also **its future opportunities**, favouring secure growth.

Choices for correct risk management can widely differ from company to company, depending on the external and internal context in which the company works, for which the concept of a *"situational approach"* is fully applicable.

2. RISK MANAGEMENT PROCESS PHASES

As risks are, due to their nature, strongly connected, they cannot be managed in a fragmented manner by independent functions and/or departments, but a dedicated process is necessary that, as such, requires a structure, an organisation and communication mechanisms. Traditionally, the phases of a *Risk Management* process are as follows:

- 1. context definition;
- 2. risk identification;
- 3. risk assessment;
- 4. risk treatment;
- 5. communication;
- 6. planning;
- 7. checking and supervision;
- 8. process review.

To be effective, each of these phases (*and, obviously, the entire Risk Management process that unites them*), as previously mentioned, must be fully integrated within the wider scope of the company organisation.

2.1 Context definition

Context definition implies:

- identifying the areas of risk that must be considered, due to the specific combination of market, product/service, manufacturing/supply process as well as external references (institutions, suppliers, banks, unions, etc.);
- congruently defining an identification and assessment activity schedule;
- organising the **necessary resources**, starting by defining duties and responsibilities.



In this phase, therefore, the limits of the approach are recorded and the base for the development of the operative system is created, having a fundamental concept as reference criteria, which is the knowledge that:

- potential risks can involve the organisation on all levels;
- the most negative consequences do not necessary refer to risks attributable to the short-sighted behaviour of those who occupy upper management positions.

2.2 Risk identification

The next phase, which is related to identifying potential risks and their description, must be confronted by analysing all possible **sources of risk** (such as, for example: the positions of the stakeholders, market changes, manufacturing errors or work accidents, etc.), within the areas of risk that were taken into consideration when defining the context.

The process of identifying potential risks must, in any case, work for the *type of organisation* and, therefore, for the type of product/service offered and the type of market in which the organisation itself operates; it normally refers to:

- the objectives, which the organisation has set for itself;
- the scenarios, which the organisation may find it must face in carrying out its business;
- the procedures or practice, which the organisation adopts for management and operational purposes.

Potential risks do not generally represent an effective risk if the organisation does not have, in reference and at the same time, a *specific weakness*. This concept, which is based on the modern approach of *Risk Management*, therefore foresees the creation of a list of *"vulnerabilities"* (*structural, managerial or operative*) concerning the areas of risk being considered, over which the corresponding list of the **sources of risk** must be critically superimposed.

Effective risk identification finally requires the support of reasonable *confirmations*, objective if possible, regarding the correctness of the analysis. These confirmations may be:

- of a direct experimental nature (the event has already occurred)
- of an indirect experimental nature (the event has already occurred in a similar situation)
- of a deductive nature (the cause effect relationships make the event appear probable).

In this way, a *"risk profile"* is outlined that is specific to each organisation *(by context and vulnerability)*, to which the subsequent actions refer.



2.3. Risk assessment

When the risks have been identified, they must be assessed (Risk Assessment) based on:

- the **probability** that the negative event will occur;
- the seriousness of the direct or indirect consequences of the event itself.

This assessment can be more or less simple, based upon the specific situation, as what is relevant for the purpose is the availability of usable *statistical data* as well as validated *analysis procedures*. The statistical data *(usable)* and the analysis procedures *(validated)* can only be acquired from similar (*or apparently similar*) situations if done in an extremely prudent manner and only after having verified the transferability of the conditions concerning both the sources of risk and vulnerability.

From the above, in conclusion, it results that the risk assessment process generally follows paths of analysis within an organisation that, in reference to:

- the likelihood of an event, refer to the potentiality of the relative risk source, the extent of the specific possible vulnerability and the level of effectiveness of the pre-existing control and reaction instruments;
- the seriousness of the consequences also refers, in addition to the type and extent of the damage, to the involved objectives (in a decreasing order of importance: the mission, the structure, the organisation and operations).

Each potential risk must, however, be perceived with greater or less intensity, with regard to the real risk content, based upon the *"force"* with which the relevant information is made available, especially when there are specific sensibilities. Therefore, the assessment process requires a constant engagement directed toward the objectivity of the judgments, in fact, if the risks are assessed in an irrational manner and their corresponding priority is assigned in an improper manner, there could be a lack of coverage and/or defence and useful resources could be wasted that, if better applied, could lead to more effective management.

Once *probability and consequences* have been established, a *"risk matrix"* is usually prepared that relates to the *"risk profile"* created in the previous phase.





Figure 1 – Risk matrix"

2.4 Risk treatment

The treatment of the potential risks *(Risk Treatment)* is the phase in which the decision making processes become particularly important. It includes, either alternatively or in combination, one or more of the following conditions:

- the transfer of the risk;
- the exclusion of the risk;
- the reduction of the risk;
- the acceptance of the risk or an amount of the risk.

The selection of one or more of the previous conditions largely depends on the specific company situation *(that is, the company's internal and external context as well as the company's real possibility to confront both of these contexts)* and must be based on a **cost-benefit analysis** that is as quantitative as possible in reference to the short, medium and long-term period.

2.4.1. Risk transfer

This condition foresees the persuasion of another party to accept the risk, through a contract. This is a typical case that concerns insurance companies, which is applied often when possible *(for example, liabilities of a criminal nature cannot be transferred)* even if at times it is done in a general manner and not, rather, in function of the specific organisation *(tailored covering)*.



2.4.2. Risk exclusion

This condition foresees the non-execution of the activity that involves a risk that cannot be transferred and/or is considered to be unacceptable. Naturally, the result is a loss of opportunity that the activity at risk would have represented in any case.

2.4.3. Risk reduction

This condition involves the adoption of managerial, technological and behavioural actions that lower the probability of risk and/or the seriousness of the possible consequences. The persistence of residual risk is often, in any case, unavoidable both for reasons inherent to the context *(institutional, managerial, technological, etc.)* in which the organisation operates, as well as for the possible simplifications and/or omissions of the analysis.

2.4.4. Acceptance of an amount of the risk

All risks (*or amounts of risk*) that are not transferred and not excluded are, as a result, accepted. The conscious acceptance of residual risk occurs, in general, when at least one of the following conditions applies:

- sufficiently low probability of the event;
- consequences of the event are proportionally of little relevance;
- great benefits if successful.

The risk (or the amount of risk) that is accepted must subsequently be controlled in agreement with what is foreseen by the following paragraph.

2.5 Planning

Planning defines the risk control methods, that is:

- the acquisition, interpretation, sending and/or storing of incoming data for the control process;
- the appropriate level and localisation for the decisions and actions connected to each type and condition of risk;
- the operative procedures and/or practice;
- the control instruments;
- the acquisition, interpretation, sending and/or storing of output data from the control process.

If the control plan is sufficiently broad and complex, it is recommended that the position of a *Risk Manager* is created, as it is an important position that is mainly directed toward *coordinating all activities and their communication*, although it does not have any direct responsibility for the risk



itself.

The planning activity is documented and collected in a *Risk Management Plan.*

2.6 Communication

The profile, the matrix, the risk treatment *(including the cost-benefit analysis)* and the control planning must be documented in detail in a **Risk Management Report**, which must be presented to all personnel that is involved in any manner and who must not only acknowledge it, but must also share in the approach and evolution, each for his or her own area of interest and according to each person's level of responsibility.

If information only should not be enough, targeted training courses should be developed with the purpose of making the *Risk Management Report* an effective management instrument. The *Risk Management Report* constitutes the **document of reference** for the entire *Risk Management* process.

2.7 Checking and supervision

Checking and supervision over time concerns (whenever applicable and possible) all control instruments (technical and managerial, preventive and supervisory, evasive and reactive, etc.) that were implemented, or planned to be implemented, in compliance with the *Risk Management Plan*, in order to verify its efficiency and effectiveness.

The checking and supervision results must be documented, evaluated and recorded.

2.8 Process review

Risk Management is a dynamic process and therefore it must be reviewed in a sufficiently frequent manner *(Risk Management Review),* based upon the experience gathered in a direct manner *(within the organisation)* or indirectly *(outside of the organisation, in similar and comparable situations),* with the purpose of:

- evaluating possible evolutions that concern any phase of the process, which could cause changes to the risk profile, matrix and/or treatment (for example, but not only: a different risk context, a different criterion regarding the acceptable risk, a different cost-benefit analysis, etc.);
- evaluating the efficiency and effectiveness of the adopted Risk Management Plan ; evaluating the checking and supervising results.

If revisions are made, another *Risk Management Report* must be created that is updated with regard to the changes that were made.



3. APPLICABLE REMARKS

As already mentioned, companies have basically always controlled many of the main risk conditions in a manner that is often not very coordinated and with little awareness, as their main objective has been the recovery of damage rather than managing the causes.

This control is normally carried out by professional people that belong to the organisation:

- in operative positions (e.g.: technical manager, sales manager, marketing manager, administrative manager, human resources manager)
- in staff positions (e.g.: quality manager, safety manager, environmental manager),
- in consultancy relationships with the organisation itself (for ex.: chartered accountant, insurance broker, legal council).

Each of these professional figures faces specific risk sources, sometimes in an implicit manner, in a non-systematic context, which can refer to general management that acts through function-based interventions. In practice, therefore, this is a costly and not very effective condition.

Risk Management intends, therefore, to be an "approach that aims to **optimise** resources, skills and behaviours, with respect to a specific risk/coverage/control configuration, which is created based on a **cost/benefit analysis** that takes the main external and internal parameters, that distinguish the **organisation**, into account".

The level of using and implementing the *Risk Management* process, which is understood as a separate process, increases steadily.

Risk management is now more often correctly perceived, and by a growing number of companies, no longer as a comparison between separate coverage alternatives, but rather as an instrument that, with respect to a *reasonable operating cost*, can involve *considerable competitive advantages*, allowing capital to be used more efficiently, reducing the volatility of the results and improving profitability.

4. RISK MANAGEMENT IN WELDING FABRICATION

As *Risk Management* is, as has been seen, a strongly *situationally-based* process (that is, depending on the specific situation in which the process itself evolves), the approach to the manufacturing of welded products can only be limited to, generally speaking, identifying the potential areas of risk in the context of reference. In fact:



- the transformation of potential risks into effective risks,
- their evaluation in terms of the probability of the event and the seriousness of the consequences,
- their treatment

widely depend on both:

- the vulnerability, on the one hand
- the potentiality, on the other

of the organisation that manufactures the welded products.

This dependency upon the vulnerability and potentiality of the organisation, which is always present, is particularly true in the case of welding based manufacturing, which relies on a complex technology in which discretional human intervention is often still significantly necessary ¹.

In order to efficiently manage the potential risks, the determining elements therefore are:

- the comprehensive knowledge of all specific aspects of the manufacturing process;
- the skill of the involved personnel.

It goes without saying that as the manufacturing process uses more **automated equipment and/or procedures** in all of its phases, the process control (*also from the point of view of transforming potential risks into effective risks*) relies more on the validation of the equipment and the procedures themselves and their integration within the system.

In manufacturing welded products, as with any other product, the main potential areas at risk include

- technical aspects;
- safety aspects;
- environmental aspects;

These potential areas of risk are connected to:

- both the technological manufacturing process
- as well as the capability of the company organisation to keep the manufacturing process itself under control.

With regard to the manufacturing process, potential risks exist, obviously, in all phases of creating

¹ Welding is a "special process", in which product quality cannot be evaluated only through final checks, but requires the continuous application of process control.

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the welded product, also in those that could appear to be irrelevant. Some of these, however, due to their nature and/or their importance, are associated with greater risk potential, which certainly include:

- the revision of the manufacturing and control **specifications** (logistical conditions, available spaces and movement potentiality, available technology, achievement of the requirements etc.);
- the sub-supply (supplier qualification, information transfer, control capability, etc);
- material management and preparation (storage and handling, sand blasting, thermal or mechanical cutting, machine moulding and/or working, edge preparation, etc.);
- the **skill** of the personnel (qualification, updating, specific experience, etc.);
- suitability of the **equipment** (type and potentiality, maintenance, validation and calibration, etc.);
- manufacturing operations (assembly, preheating, welding, thermal treatments, etc.);
- control operations (chemical and physical tests, non destructive checks, hydraulic test, etc.);
- final treatments (mechanical working, surface treatments, painting, etc.).

With regard to the company organisation, the following is relevant:

- the allocation of **responsibilities** (Welding coordinator, Protection and prevention service manager, Environmental aspects manager, etc.) and **resources**;
- the procedures or operative and managerial references (Guidelines from the 'European Welding Federation - EWF and/or the International Instituteof Welding - IIW, etc.).

All of these three potential risk areas can be substantiated, in the final analysis, in damage of the following nature:

- commercial (for example, loss of market share);
- financial (for example, the creation of additional manufacturing costs);
- contractual (for example, requests for damage in civil proceedings);
- regulatory/legislative (for example, calls for administrative and/or criminal liability).

In conclusion, therefore, the safe management of the welding-based manufacturing 1process involves the organisation's capability of systematically guaranteeing the requirements foreseen for the product, in a context that pays attention to:

- the market;
- responsibilities (possible sources of potential risk) of any type connected to it.
 This capability represents an essential *"asset*", as it is in fact impossible to create any industrial profit without *effective* and *far-sighted* company management.