



RISK ASSESSMENT STRATEGIES

Overview

What is risk ?

- Risk implies future uncertainty about deviation from expected earnings or expected outcome.

What is risk assessment?

- Risk assessment is the identification of hazards that could negatively impact an organization's ability to conduct business.
- These assessments help identify these inherent business risks and provide measures, processes and controls to reduce the impact of these risks to business operations.
- Risk assessment is also called as risk analysis.





Literature Review

Various risk assessment strategies are already implemented by many organizations. They are as follows-

ISO 31000 risk management framework

- It is a family of standards that provide principles and generic guidelines on risk management. It suggests that effective risk management is characterised by principles, framework and process.

NIST Special Publication 800-30 (National Institute of Standards and Technology)

- The process given by this guide includes prepare for the assessment, conduct, communicate & maintain the assessment.

OCTAVE (Operationally Critical Threat, Asset, and Vulnerability Evaluation)

- A self-directed technique , based on eight processes that are broken into three phases which are- Build Asset-Based Threat Profiles , Identify Infrastructure Vulnerabilities & Develop Security Strategy and Plans. The OCTAVE approach uses an asset-based information security RA.

Purpose of the study

- RA (risk assessment) is the most important step as it sets the foundations for information security in your company.
- The purpose RA is to identify potential problems before they occur so that risk-handling activities may be planned and invoked as needed across the life of the product or project to mitigate adverse impacts on achieving objectives.
- RA should be conducted systematically, iteratively and collaboratively, drawing on the knowledge and views of stakeholders.





Definitions

Types of Risk Assessment

Quantitative assessments

- Involve a set of methods, principles, or rules for assessing risk based on the use of numbers. This type of assessment most effectively supports cost-benefit analyses of alternative risk responses or courses of action.

Qualitative assessments

- Involve a set of methods, principles, or rules for assessing risk based on non-numerical categories or levels (e.g., very low, low, moderate, high, very high).

Semi-quantitative assessments

- Uses bins, scales, or representative numbers whose values and meanings are not maintained in other contexts. It provides the benefits of both quantitative & qualitative assessments.



Defining risk criteria

While risk criteria should be established at the beginning of the risk assessment process, it should be continually reviewed and amended, if necessary.

To set risk criteria, the following should be considered:

- The nature and type of uncertainties that can affect outcomes and objectives (both tangible and intangible);
- How consequences (both positive and negative) and likelihood will be defined and measured;
- Time-related factors;
- Consistency in the use of measurements;
- How the level of risk is to be determined;
- How combinations and sequences of multiple risks will be taken into account; the organization's capacity.



Factors influencing selection of RA techniques

- Complexity of the problem and the methods needed to analyze it,
- The nature and degree of uncertainty of the risk assessment based on the amount
- Of information available and what is required to satisfy objectives,
- The extent of resources required in terms of time and level of expertise, data needs or cost,
- Whether the method can provide a quantitative output.

Findings

1. CHECKLIST

A simple form of risk identification.

- Check-lists are lists of hazards, risks or control failures that have been developed usually from experience, either as a result of a previous risk assessment or as a result of past failures.

The procedure is as follows-

- The scope of the activity is defined;
- A check-list is selected which adequately covers the scope.
- The person or team using the check-list steps through each element of the process or system and reviews whether items on the check-list are present.

Resources and capability in the checklist technique-low

- Nature and degree of uncertainty-low
- Complexity-low
- Can provide Quantitative output-no



Findings

2. Delphi technique

- A means of combining expert opinions that may support the source identification, probability and consequence estimation and risk evaluation..
- Involving independent analysis and voting by experts.
- A group of experts are questioned using a semi-structured questionnaire.
- The advantages of using this technique is that all views have equal weight, which avoids the problem of dominating personalities; people do not need to be brought together in one place at one time.

Resources and capability in the checklist technique-medium

- Nature and degree of uncertainty-medium
- Complexity-medium
- Can provide Quantitative output-no



Findings

3. Root cause analysis

- A single loss that has occurred is analyzed in order to understand contributory causes and how the system or process can be improved to avoid such future losses.

Resources and capability –medium

- Nature and degree of uncertainty-medium
- Complexity-medium
- Can provide Quantitative output-no

4. Business impact analysis

BIA provides an agreed understanding of:

- The identification and criticality of key business processes, functions and associated resources that exist for an organization;
- How disruptive events will affect the capacity and capability of achieving critical business objectives;
- The capacity and capability needed to manage the impact of a disruption and recover the organization to agreed levels of operation.



Findings

- A BIA can be undertaken using questionnaires, interviews, structured workshops or combinations of all three..

Resources and capability –medium

- Nature and degree of uncertainty-medium
- Complexity-medium
- Can provide Quantitative output-no

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- Nature and degree of uncertainty-medium
- Complexity-medium
- Can provide Quantitative output-no

5. Fault tree analysis

- A technique which starts with the undesired event (top event) and determines all the ways in which it could occur. These are displayed graphically in a logical tree diagram. Once the fault tree has been developed, consideration should be given to ways of reducing or eliminating potential causes / sources.
- The factors identified in the tree can be events that are associated with component hardware failures, human errors or any other pertinent events which lead to the undesired event.
- A fault tree may be used qualitatively to identify potential causes and pathways to a failure (the top event) or quantitatively to calculate the probability of the top event, given knowledge of the probabilities of causal events.
- FTA is especially useful for analyzing systems with many interfaces and interactions.



Findings

Resources and capability –medium

- Nature and degree of uncertainty- high
- Complexity-medium
- Can provide Quantitative output-yes

6. HAZOP (Hazard and operability studies)

- A general process of risk identification to define possible deviations from the expected or intended performance. The criticalities of the deviations due to deficiencies in the design, component(s), planned procedures and human actions are assessed.
- It is a structured and systematic examination of a planned or existing product, process, procedure or system. It is a technique to identify risks to people, equipment, environment and/or organizational objectives.
- The study team is also expected, where possible, to provide a solution for treating the risk.
- The HAZOP process is a qualitative technique based on use of guide words. It is generally carried out by a multi-disciplinary team during a set of meetings.
- A HAZOP study is usually undertaken at the detail design stage, when a full diagram of the intended process is available, but while design changes are still practicable.
- After the study a written record of the process is created which can be used to demonstrate due diligence.



Findings

7. Structured Interview and brainstorming

- Brainstorming involves stimulating and encouraging free-flowing conversation amongst a group of knowledgeable people to identify potential failure modes and associated hazards, risks, criteria for decisions and/or options for treatment.
- Brainstorming can be used in conjunction with other risk assessment methods or may stand alone as a technique to encourage imaginative thinking at any stage of the risk management process.
- It is therefore particularly useful when identifying risks of new technology, where there is no data or where novel solutions to problems are needed.

Brainstorming may be formal or informal.

- Formal brainstorming is more structured with participants prepared in advance and the session has a defined purpose and outcome with a means of evaluating ideas put forward.
- Informal brainstorming is less structured and often more ad-hoc.

Resources and capability -low

- Nature and degree of uncertainty-low
- Complexity-low
- Can provide Quantitative output-no



Findings

8. Root cause analysis (RCA)

- The analysis of a major loss to prevent its reoccurrence is commonly referred to as RCA, Root Cause Failure Analysis (RCFA) or loss analysis.
- RCA is focused on asset losses due to various types of failures while loss analysis is mainly concerned with financial or economic losses due to external factors or catastrophes.
- It attempts to identify the root or original causes instead of dealing only with the immediately obvious symptoms.

RCA has following broad areas of usage:

- Safety-based RCA is used for accident investigations and occupational health and safety;
- Failure analysis is used in technological systems related to reliability and maintenance;
- Production-based RCA is applied in the field of quality control for industrial manufacturing;
- Process-based RCA is focused on business processes;
- System-based RCA has developed as a combination of the previous areas to deal with complex systems with application in change management, risk management and systems analysis.



Findings

9. FN Curves

- They are a graphical representation of the probability of events causing a specified level of harm to a specified population. They are a useful way of presenting both frequency & consequence information in an accessible format.
- FN curves show the cumulative frequency (F) at which N or more members of the population that will be affected.
- FN curves may be used to compare risks, for example to compare predicted risks against criteria defined as an FN curve, or to compare them with data from historical incidents, or with decision criteria.

There are two types of FN Curves.

- In general, theoretical FN curves are most useful for system design.
- Statistical FN curves are most useful for management of a particular existing system.

They are a well-established method for presenting risk assessment results but require preparation by skilled analysts.



Findings

10. Risk indices

- A risk index is a semi-quantitative measure of risk which is an estimate derived using a scoring approach using ordinal scales.
- They can be used to rate a series of risks using similar criteria so that they can be compared. Scores are applied to each component of risk,

for example contaminant characteristics (sources), the range of possible exposure pathways and the impact on the receptors.

11. Cost/benefit analysis (CBA)

- It can be used for risk evaluation where total expected costs are weighed against the total expected benefits in order to choose the best or most profitable option.
- The output of a CBA is information on relative costs and benefits of different options or actions. This may be expressed quantitatively as a net present value (NPV) an internal rate of return (IRR) or as the ratio of the present value of benefits to the present value of costs.
- NPV is the combination of the present value of all costs and all benefits to all stakeholders. A positive NPV implies that the action is beneficial.
- Qualitatively the output is usually a table comparing costs and benefits of different types of cost and benefit, drawing attention to trade-offs..



CONCLUSION



In this report, we have discussed some risk assessment techniques which any organization can adopt.

According to me, I would suggest an organization to go with the HAZOP technique or with RCA technique.

As both involve comprehensive studies & can go till the root cause of the risk so that the organization does not face the same type of risk again in the future.

Also, the techniques described in the report can be used collectively, i.e. the organization can do the risk assessment by taking more than one strategies.



THANK YOU

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