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**Chapter 7(RISK)**

A risk event that occurs late in a project can be more costly in terms of time and money than a similar event nearer the start of the project. That is because as time passes there will be a greater value of work in progress and higher sunk costs at risk of loss or damage. It can occur at any stage in a project.

Some projects, because they are small or similar to projects that the contractor has undertaken in the past, might not need special attention to risk management other than considering some of the insurance issues discussed later in this chapter. However, for any project that breaks new ground or is complex and large, a risk management strategy must be developed, first to identify as many potential risks as possible and then to decide how to deal with them. For very large projects it might be necessary to appoint a risk manager, who can devote all or most of his or her time to ensuring that a comprehensive risk strategy is put in place and then reviewed from time to time throughout the project to ensure that it remains valid

**IDENTIFYING THE POSSIBLE RISKS**

It is almost certain that some tasks will not be completed in line with their duration estimates and budgets. Some might exceed their estimates, whilst others could be finished early and cost less than expected. Risks events can occur in any kind of project and they can range from the ‘accident waiting to happen’ variety to the most unexpected and bizarre. In a lifetime spent with projects I have known risk events ranging in scale from a tragic underground mining disaster to an exploding hearing aid. They can even occur late in the project life history, after the project is finished and handed over (design modifications needed for the Millennium Bridge project in London, for example).

**RISK ANALYSIS**

This can either be qualitative or quantitative.

1. **Qualitative risk analysis** involves considering each risk in a purely descriptive way, to imagine various characteristics of the risk and the effect that it might have on the project. Qualitative risk analysis goes at least one stage further than qualitative analysis by attempting to quantify the outcome of a risk event or to attach a numerical score to the risk according to its perceived claim for preventive or mitigating action.

* **Qualitative Cause and effect analysis-**

**\*** Fault-tree analysis and Ishikawa fishbone diagrams are methods commonly used by reliability and safety engineers to analyse faults in design and construction.

**\*** Failure mode and effect analysis (FMEA) Failure mode and effect analysis has also been imported into project risk management from reliability and quality engineering, but this method is possibly more helpful because it starts by considering possible risk events (failure modes) and then proceeds to predict all their possible effects.

**\*** Risk classification matrices- As with failure mode and effect analysis, this again is a qualitative method, in which no attempt is made to evaluate any risk numerically. Each risk item is considered for its likelihood of occurrence (chance) and for the relative scale of the impact on the project should it occur.

1. **Quantitative analysis** methods attempt to assign numerical values to risks and their possible effects. They often examine the probable impact on project time and costs. Alternatively, the evaluation process can produce a ranking number for every identified risk.

* **Qualitative risk assessment matrix**

**\*** Failure mode effect criticality analysis (FMECA)

**RISK REGISTER**

When all the known risks have been listed, assessed and ranked it is time to consider what might be done about them. That process requires that all potential risks be listed in a risk register (risk log). The risk register should be reviewed and updated regularly throughout the life of the project. It is advisable to use the computer to sort the risks according to their ranking, with the highest ranked risks placed at the top.

**METHODS OF DEALING WITH RISKS**

When all the known risks have been identified, assessed, ranked and registered it is time to consider what might be done about them. These are the decisions that must be entered in the two columns at the right hand of the risk register. The project manager usually has a range of options:

1. Avoid the risk – The only way to avoid a risk is to abandon the possible causes, which could even mean deciding not to undertake a project at all.
2. Take precautions to prevent or mitigate risk impact – This is a most important part of risk management, requiring the active participation of all managers and staff.
3. Accept the risk – Rain might make the day chosen for office relocation miserable for all concerned but the risk would have to be accepted. There are numerous small things that can go wrong during the course of any project, and most of these risks can be accepted in the knowledge that their effect is not likely to be serious, and that they can be overcome by corrective measures or replanning.
4. Share the risk – If a project, or a substantial part of it, appears to carry very high risk, the contractor might seek one or more partners to undertake the work as a joint venture. Then the impact of any failure would be shared among the partners. Sharing a risk big enough to ruin one company might reduce its impact to little more than a temporary inconvenience.
5. Limit the risk – There are occasions when project risks should only be accepted with safeguards in place to limit their potential effect. A good example is an internal project, perhaps for pure research, that cannot be adequately defined at the outset. No one can tell how much the project will eventually cost or what its outcome might be. Yet the opportunities are too great to consider avoiding the risk altogether.
6. Transfer the risk – Some risks, or substantial parts of them, can be transferred to another party on payment of a fee or premium. This leads to the important subject of insurance, which is discussed in the next section.

**INSURANCE**

The financial impact of many risks can be offset by insuring against them. The client pays the insurance company a premium for this service, and the insurer might itself choose to spread the risk by sharing it with one or more other insurance companies.

**CATEGORIES OF INSURANCE**

There are four main classes of insurance:

1. legal liabilities (payments to others as a result of statutory, contractual or professional commitments, compensation awarded by the courts, legal expenses, but not fines imposed by the courts);
2. protection against loss or damage to property, including temporary works and work in progress, owned construction plant, hired-in plant and employees’ effects;
3. cover relating to personnel;
4. pecuniary loss.

A policy may combine cover for two or more of the above classes of risk.

* **Obligatory insurances**

Legal requirements oblige companies to obtain adequate insurance cover against some risks. These obligations arise either from various government laws and regulations or from conditions contained in a binding commercial contract.

1. Statutory requirements
2. Contractual requirements and other legal liabilities

**\*other risk that can be covered by insurance**

1. Decennial insurance
2. Accident and sickness insurance
3. Key person insurance
4. Pecuniary insurance

**NOTE:** **There are risks which an underwriter will either refuse to insure, or for which the premium demanded would be prohibitive.**

**PLANNING FOR A CRISIS**

Some risk events can have such a potential impact on a project that special crisis management contingency plans must be made. Such contingency plans can extend to projects that would need to be set up specially and rapidly to deal with the sudden crisis.

* **Organization**- Once the possibility of a crisis has been established, the first step in devising a contingency plan is to identify the key people who will take charge of the crisis management project. These people will constitute a sleeping organization, ready to awake at a moment’s notice in case of need. The core organization might include senior representatives of local and national government, the emergency services, particular charities and relief organizations, and so on. Each person should have the authority to instruct others within their home organization and the permission to identify the relevant resources that could be made available should the crisis happen. A team leader or steering committee must be appointed that will manage the project should it become live. This group of key people might be called the crisis action committee.
* **Contingency planning-** Once the key people have been elected or selected to serve on the action committee, they must meet to design appropriate contingency plans, and then meet again at regular intervals to ensure that the plans are kept up to date. The committee might have to arrange for emergency funds, stores and special equipment to be stockpiled or at least located against the time when they might suddenly be needed. Lists of secondary organizations and other helpers must be established, which although not part of the action committee could be called upon to give urgent and immediate assistance.
* **Tabletop and other exercises**- A tabletop exercise can contribute to this process, where the members of the action committee carry out a role-playing exercise to consider as exactly as possible what might happen and what they themselves and their subordinates might do should the crisis happen. Many crisis contingency plans can be tested by field exercises, in which some or all of the services act out their parts as if the crisis had actually happened. Field exercises can reveal shortcomings in the contingency plans and test vital aspects such as mobility, response speeds, and how to communicate and coordinate the various participants under emergency conditions, when power, water and telephones might all be out of action.

**Chapter 9 (PROJECT ORGANIZATION STRUCTURES)**

**EFFECTIVE ORGANIZATION AND COMMUNICATIONS**

An effective organization will have clear lines of authority and every member of the project will know what he or she is expected to do to make the project a success. This is part of the management communication framework needed to motivate all the staff employed. A well-motivated group can be a joy to work with. A badly informed group, with vague responsibilities and ambiguous levels of status and authority, is likely to be poorly motivated, slow to achieve results, costly to run and extremely frustrating to work with.

**ORGANIZATION CHARTS**

It is not possible to discuss organizational structures in any depth of detail without the aid of charts (or ‘organigrams’ as they are often unfortunately known). No organigram can adequately depict all the nuances and politics of a particular organization, but we all need to understand, as far as possible, the meanings of the charts that we encounter during our working lives. In practice organizations can be far more complex. For example, in all except the most outdated, authoritarian, militaristic style of company there will always be informal lines of communication and feedback up, down, sideways and diagonally across the organization. That’s no problem and is usually to be encouraged. Whenever an organization changes, or when a new project is opened, it is wise and customary to produce a new organization chart and distribute it. But that simple process, however innocently intended, can provoke strong and unexpected reactions.

**WORK MANAGEMENT IN A CONVENTIONAL MANUFACTURING ORGANIZATION**

A clearer picture of some of the problems encountered in project handling can be seen by studying the management organization structure of a manufacturing company. A small engineering company like Street Components Ltd might have been organized in its earlier days. Organizations of this type are known as ‘line and function’, because they are set up to manage work within departmental (functional) boundaries or specialist disciplines. Thus, the chief engineer is responsible for design and development but very little else. The works manager concentrates on the production aspects of the business. Managers concentrate on those reporting directly to them in the line and they generally have no direct responsibilities outside their own functions. Of course, no company could ever exist on such a rigid basis and there must be some cooperation and interaction between different managers.

**PROJECT MATRIX ORGANIZATIONS**

1. Matrix organization for a single project
2. Matrix organization for a multiple project

**\*Matrix Strengths**

1. Weak matrix- In this, each project manager’s degree of authority and control is less than that enjoyed by the managers of the functional departments. Each project manager is expected to plan and coordinate the project work, but is not empowered to issue direct commands through the line organization. Thus, every project manager in a weak matrix is entirely dependent on the departmental managers for the provision of people and equipment for project tasks. The project managers, although key people, have to be content with a coordinating role. It can encourage conflicts.
2. Balanced matrix- This very similar to a weak matrix and is sometimes described as such. In the balanced matrix, there is a declared balance of power and authority between the project managers and the functional department managers. Project and functional managers are expected to collaborate constructively and allocate personnel and other resources to tasks according to genuine priorities to ensure the successful outcome of all projects. This is perhaps the most common form of matrix. It is elegant in theory and has many advantages over other forms of organization. It is not however, as some have claimed, a universal solution for all projects. All organization forms have their advantages and disadvantages.
3. Stronger forms of the matrix- In a ‘project matrix’ the authority of each project manager takes precedence over the authority of the functional managers, at least as far as the allocation and progressing of work is concerned. In a ‘secondment matrix’, which is the strongest form of the matrix, the functional managers must nominate and assign members of their departments to work full-time for the project managers. The people assigned report principally to their respective project managers for as long as each project manager needs them.

**CUSTOMER’S PROJECT MANAGER**

Whenever a company sells a project to a customer, that customer will probably wish to monitor progress in order to be assured that there is every chance of the work being completed in accordance with the contract. For simple manufacturing contracts this role might be performed by the customer’s purchasing department, using its own expediting and inspecting personnel. But, except in this very simple case, the customer might want to appoint an internal project manager to oversee the contract and manage the customer’s own activities for accepting and taking over the completed project. The appointment of a customer’s project manager would be expected, for example, where the customer is involved in planning to accommodate, install and start up plant supplied under the project. Sometimes the customer will seek the services of an independent professional project manager, to oversee the project in return for a management fee. This role is often undertaken by specialist companies or by professional partnerships and individuals.

**PROJECT MANAGERS IN CUSTOMER/SUPPLIER CHAINS**

There is often more than one project contractor, especially in projects involving construction work. In multi-contractor projects it is probable that one contractor would be nominated by the project customer (the project owner) as the main or the managing contractor, with overall project responsibility to the owner for managing or coordinating all the other contractors and subcontractors. The managing contractor, in addition to serving the project customer, will itself be a significant purchaser (that is customer) for all the expensive equipment and other goods or services to be provided by suppliers and subcontractors. For large projects some of these subcontracts could amount to significant projects in their own right, each needing planning and project management procedures similar to those used by the managing contractor. Some equipment manufacturers and construction subcontractors would therefore need to assign project managers to manage their own internal subprojects. Indeed, the managing contractor might even insist that such project managers are appointed, and could wish to question and approve the project management methods to be used, possibly as a precondition to awarding the purchase orders or contracts.