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Major Engineering Project Performance

Project life cycle theories

A key aspect of the project life cycle is the level of influence versus the cost of change. Or what is called the potential to add value versus the cost of change. Let's think about the cost of change first. We can ask how much it costs to move a door. Well, it depends on which phase the project is in. If we are in the concept phase with just a draft, it can take one minute to change the draft. So, let's say it cost one dollar. If you have already made some designs and have printed them, it can take 10 minutes. So, let's say it cost $10. If you already have the bricks ready to build, it might take one hour, so $100. If you have already built the door but the people are still in the site, you need to break the wall, move the door and then close the empty space. This is perhaps one day of work and material for $1,000. If you have already finished everything and the labourers have gone away, well, you need to call them back to do the job, redecorate, clean, et cetera. So it might cost $3,000. As you can see the cost increases over the life cycle, even if the change taking place is exactly the same. While the cost increases, the possibility to add value decreases. This is exactly why the concept phase is the most critical. The cost of change is the lowest and the possibility to add value is the highest.

According to the 'Project management body of knowledge', or 'PMBOK', the generic life cycle structure generally displays the following characteristics. Cost and staffing levels are low at the start. They peak as the work is carried out and then fall as the project reaches completion phase. This is linked to the cost of change explained before. The typical cost and staffing curve might not apply to all projects. A project might require significant expenditure to secure resources early in its life cycle, for instance, or be fully staffed from a point very early in its life cycle. However, this bell shaped curve is very typical. Particularly for infrastructure projects and major projects. Risk and uncertainty are highest at the start of the project. These factors decrease over the life of the project as decisions are reached and as deliverables are accepted. At the start of a project, there are high levels of risk and uncertainty. As the project progresses, these levels decrease once the project becomes more familiar, and decisions are made, and the outcomes are achieved.

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Chapter 2 of the PMBOK 5th edition, provides a very nice approach to the project life cycle. There is an initial process, then processes involving planning, execution, and closing. It's important to understand that even during the project itself, we have planning processes and execution processes. It is not true that we have all the planning at the beginning. We have what we usually call the rolling wave approach to the project. It means that at the beginning of the project, we have a very long-term plan of years with very few details, a medium-term plan of one year, with greater detail, and the short-term plan of one month with very precise details. Then every week, we move the month forward, reviewing and filling in details for the month ahead. Perhaps every two to three months, we will review the yearly plan and every six to nine months, we review the overall plan.

Actually a project could be subsequent to another project. Later, we will learn about nuclear decommissioning, where this is absolutely the case. So, when you have a clean-up of a hazardous waste site, there are usually three projects running one after the other. So, the decommissioning of the facility is just the first step. Then there is the waste removal and clean-up, and later the landscaping. These can be easily three project phases, with three different budgets, by three different organisations. When projects have more than one phase, the phases are part of a generally sequential process designed to ensure proper control of the project and achieve the desired product, service, or result. However, there are situations when a project might benefit from having overlapping or concurrent phases. There are two basic types of phase-to-phase relationships. One is a sequential relationship. In this case, a phase of a project follows on only once the previous phase is finished. Because we are only moving on to the next project phase after we've achieved the first, this can reduce uncertainty. Sometimes there is an overlap between phases. This is very common in the construction industry. The idea is that you have a design phase and a construction phase that are overlapped. This also happens in the nuclear industry, so you don't push the design of a nuclear reactor until the last detail, until the last element. So, in an overlapping relationship, the next phase of a project can begin before the previous one has finished. This allows us to speed up the project's schedule, but sometimes this increases the amount of risk involved because of the lack of details and more changes required. So, in summary, it is very important to remember that the project phase is just a phase of the infrastructure life cycle, and that an infrastructure can have more than one project phase. Moreover, the project phase is made up of different phases. But the most critical are the early stages when the cost to change is the lowest and the possibility to add value is the greatest.

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