1 Falling Short of Expectations

How Executives Struggle to Deliver the Value from Their Capital Projects

Executives often start out with high hopes for their capital projects, only to have them fall short of expectations. Capital projects are investments of substantial company resources to develop, to improve, or to refurbish an asset that is expected to generate cash flows for more than one year. Only 60 percent of finished projects actually meet all objectives after the project is complete and the asset was put into service.[1] The success rate is not much better than a coin flip. The complaints about projects range from business cases ruined by cost overruns, to market windows missed because the project was late, to assets that did not perform as expected and that are expensive to operate.

As an executive responsible for capital, you do not have to accept these results. Success or failure is not random. I will show you what you can do to increase the probability of a successful project, make your project portfolio pay off as expected, and, critically, reduce the chances of the disaster project that loses all the capital investment and gets executives fired. The road to success starts with you. Success will require your active leadership and participation in the projects that you are sponsoring or that your organization has a major role in.

How do executives cause projects to fail? Here is a real example. A company initiated a small project to boost operating margins by consolidating production at one factory. The plan was to relocate some equipment from an older factory to a newer one before shutting down and selling the old factory. The project had a very strong business case and was expected to pay back its investment in less than a year. A critical success factor for the project was to have the consolidated facility up and running in time for a three-month production period

[1]Results from Independent Project Analysis (IPA) project database.

when the factory would be run at full capacity. The factory was used to process an agricultural product, and the new factory had to be ready for the harvest. The project was a failure because the consolidated factory was only able to run at half capacity during the production window. The business needed three supplemental projects to finally bring the facility up to full capacity.

So, what happened? How did this project turn out to be a failure—and why were the executives in charge responsible? Many mistakes were made, but the most important one was that the executives delayed the start of the project so that the older facility could finish a production run. Another bad decision was not allowing the project team to get input from the operators of the old factory because of the sensitivities of shutting down the old factory where people were about to lose their jobs. The late start caused mistakes in the technical design because of the rush to get the work done. And because the team could not work with the factory operators, they had to make assumptions about how the equipment would be reused—and those assumptions turned out to be wrong.

The root cause of the failure was that the executives never reconciled the conflict in their objectives. On one hand, they wanted to keep the old factory running and delay the announcement of the closing for as long as possible. On the other hand, they wanted the consolidated factory up and running in time for an important seasonal window. The desire to achieve both objectives is understandable. Executives face tremendous pressure to deliver value from capital. Delivering that value often requires meeting targets that are hard to achieve. In this case, the executives should have acknowledged the risk in the objectives and developed a strategy to reduce the risk. The mitigation would have lengthened the payback period but would have still allowed for a profitable project. Instead, the business lost money on the investment.

Background and Basis for the Book

At Independent Project Analysis, Inc. (IPA), we have been studying the problem of how businesses can maximize the value created by their capital projects for nearly 30 years. That is our mission. Our quantitative benchmarking services are used by the world's largest industrial companies as the core of their continuous improvement programs to derive more value from their projects. IPA's empirical research has led to the widespread adoption of project management concepts such as Front-End Loading (FEL) and Value Improving Practices (VIPs). The work of IPA's founder, Edward W. Merrow, has become the de facto handbook for the development and execution of megaprojects.[2]

For the past 22 years, I have worked directly with IPA clients all over the world evaluating projects and providing guidance on how to improve both individual projects and project systems. About eight years ago, I started a series of studies on the initial stages of capital project development. A capital project starts with an idea that a business need exists. Unfortunately, fully developed, viable projects do not fall from trees. There is hard work to be done to shape and define opportunities into projects that deliver sufficient benefits to justify the cost and risk. I have always been fascinated with these activities and, in particular, how a business and project organization should work together to translate a set of objectives for growth and profit into a doable project. Throughout this book, I will describe the executive's crucial role in capital project development as well as the steps necessary to ensure that the project organization listens carefully and fully to what the business needs.

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[2]Edward W. Merrow, *Industrial Megaprojects: Concepts, Strategies, and Practices for Success* (Hoboken, NJ: Wiley, 2011).

Capital Projects Create Value

Capital projects are high-risk, high-reward activities for both the company and the executives involved with the project. Project success is critical to the long-term financial success of a company. Projects can be a business's main engine for profitable organic growth by introducing new products or services or by increasing the production capacity of existing products and services. For example, a financial services company may have invented a new algorithm for web-based investment advice but still needs to design the application and deploy the IT infrastructure to handle the expected growth in customers. A specialty chemical company may have struck an advantageous marketing deal with a foreign partner but now needs to build a plant to make the product. A manufacturing company may have spent years developing a new technology that will cut production costs in half, allowing it to undercut its competition and take market share, but needs to build a factory to deploy the technology. Projects can also make a business more efficient or solve nagging problems. For example, a project might purchase and deploy new software systems that make the company's sales force better. Even seemingly mundane projects to upgrade or refurbish existing assets represent significant commitments of capital that need to pay off to keep the company competitive.

Capital projects actually create value when the benefits from the asset created or modified by the project exceed the project cost. The most common method for measuring the added value of a project is the net present value (NPV) generated by the investment. The formal definition of NPV is the present value of future cash flows discounted at the appropriate cost of capital, minus the initial net cash outlay. More simply, NPV is the amount of shareholder wealth created from a capital investment after accounting for the total cost of the investment and the time value of money. For example, a $10 million capital project that generates $1 million in NPV has

enriched the company owners by $1 million. Positive NPV from a capital investment is a good thing. Unfortunately, it is entirely possible for a capital project to make shareholders worse off than when they started. About one in seven projects will lose all of that $10 million capital investment.

Most Projects Create Less Value Than Expected

Executives approve or reject capital projects based on the project's expected value. The financial gap between what was expected from a capital project when it was approved and what was actually achieved can be measured. The average project delivers 22 percent less NPV than what was forecasted when the project was funded. That is what we at IPA found in a study of 431 completed industrial sector capital projects. The business goal for each project was to increase profits by adding new production or manufacturing capacity.[3] The 22 percent NPV erosion means a project targeting profit of $1 million would come out only $780,000 ahead on average.

The good news is that the average project is profitable; otherwise, everyone would be bankrupt! The bad news is that the promised profitability is often missed by a large and highly unpredictable margin.

Results Apply to All Types of Projects

The results of this study of industrial projects are important to you even if you are not an executive involved in a multimillion-dollar project to build a new factory. The conclusion that capital projects often fall short of delivering the expected business value applies to any

[3]The projects were from 64 different companies in 11 different industrial sectors, located across the globe, and ranging in size from $100 million to $20 billion.

type of project. It does not matter whether the project is to construct a new office building or to develop new software. In fact, the performance of capital projects done by companies with less experience and less infrastructure for doing projects is probably a lot worse. The industrial companies in my study are capital intensive, spending hundreds of millions and in many cases billions in capital every year to build new or to refurbish their assets. Despite the importance of capital to their long-term success, these companies still struggle to consistently deliver the expected business value from their projects. Imagine the challenge for the executives of a company that only does the occasional capital project!

Sources of Value Erosion Are Not Limited to Cost and Schedule Overruns

Value erosion occurs when what was actually delivered by a project is lower than what was promised when the project was funded. Cost and schedule overruns are usually thought of as the main culprit of value erosion, and they do indeed make a significant contribution to lower NPV, but the largest source of value erosion for these industrial projects has nothing to do with how the project was managed. The breakdown of value erosion falls into three categories in order of importance: (1) demand for the product was lower than expected, (2) the cost and/or schedule were overrun, or (3) the facility did not operate as expected. Any single project may have done well in one or two areas but fell short in others. These are just the averages for each category (see Table 1.1).

Some of the reasons people gave for the lack of demand include:

- "Lost our biggest customer."
- "Orders were lower than expected."
- "Prices were not high enough to keep the plant running."

Table 1.1 Average Value Loss by Category

Expected value	100%
Lower sales	−10%
Cost and schedule overruns	−7%
Asset performance shortfalls	−5%
Actual value delivered	78%

Changes in economic conditions, competitor actions, and shifting customer preferences are outside executives' control, and they make demand and price forecasts inherently uncertain, especially in the short term. Yet overconfidence in the market forecast by executives is a common source of value erosion, especially for projects that destroyed all the capital invested. The project sponsors are so certain about the revenue forecast that they are willing take on the risk of a significant cost overrun to accelerate the schedule to meet a market window when demand or prices are expected to rise rapidly. The value erosion caused by the cost and schedule overruns is doubly painful when demand is lower than expected.

What executives *do* control is the quality of the work behind the market forecast used to justify the project. In Chapter 3, I will show you that projects based on rigorous market analyses are 30 percent less likely to face a lack of demand. In other words, the chances of building unneeded capacity are much lower if executives establish requirements for developing a reliable market forecast and check that the requirements are met.

The average project erodes 5 percent of value because the production facility built by the project cannot produce what the business needs. For example, a software application may not meet all the service-level requirements established by a business. Responsibility for asset performance shortfalls is usually shared among all the groups involved in the project. Sometimes the asset could not make the

product because it was never designed for that capability. The project sponsor may not have communicated the requirements clearly to the project team. It is also true that project teams sometimes do not hear what the sponsor is saying. Other times, the shortfall is due to innovative technology not working as well as expected. The technology executive may have downplayed the technical risk of the innovation. Finally, the shortfalls may occur because of mistakes made in the design or construction of the facility, often the result of a project trying to cut corners or go faster to meet the cost and schedule targets set by executives.

The results of the study show that responsibility for value erosion is shared across the organization. They also mean that fixing the problem involves executives across the organization working to improve their own areas as well as how their group interacts with others to create a common understanding as a project is developed and executed.

How to Deliver the Value Promised

The proven processes to create more business value from investments and prevent value erosion are well known and largely accepted, at least on the surface. Three-quarters of IPA's clients have a perfectly serviceable capital project development and delivery process. I will go into more detail in the next chapter, but the process covers the entire life cycle of the project from inception to the point when the asset is put in service. Let's say R&D is finishing up the development of a new product and a new manufacturing facility is needed to make the product. The usual process for creating an asset combines a set of defined development stages with decision gates at the end of each stage. The stage-gate process for this opportunity starts when someone is assigned to investigate ways to produce the new product. The process ends when the factory is in service. The stages sequence work

Table 1.2 Projects That Meet the Stage-Gate Process Requirements Tend to Deliver the Expected Value

	Met All Requirements	Met Some Requirements	Did Not Meet Any Requirements
Value delivery (Actual NPV/Expected NPV)	+5%	−22%	−45%

in the order needed to identify and deliver value, and the gates allow executives to control the project's progress through the process. The process is managed by a project governance structure that assigns different executives specific roles and responsibilities, creating the checks and balances needed for good project decision making.

There isn't even much debate company-to-company on what the process should look like. Although there are some differences to accommodate a particular industry, there is very little substantive difference in the fundamental approach companies take toward capital project development.

Moreover, the process works—when it is used correctly. Projects that followed a process, on average, actually added slightly more value than what was forecast when the project was funded, while projects that did not meet any of the process requirements eroded about half the expected NPV (see Table 1.2). The average 22 percent value erosion shows that most projects sort of muddle through, meeting some requirements while not meeting others.

The assets created by projects that followed the process were much less likely to face a lack of demand, have cost and schedule overruns, or have performance issues. Critically important to understand is that there are no average differences in the market risk and external project risk faced by the projects in the three categories. That is, the projects that met all the requirements were not any less complex or inherently less risky than those that did not. Rather, using

the stage-gate process effectively allowed executives to navigate through the complexity, address risks, and deliver better results. Throughout the book, I am going to give specific examples, both good and bad, to illustrate how you can use the process to get better results for your projects.

Causes of Value Erosion Often Start Early

One of the key findings of the research I have completed at IPA is that the quality of the starting point is a very strong predictor of the project's eventual business success. You can think about the sequence of activities in the stage-gate process in the following way: identify the business need, choose the preferred solution for meeting the business need, plan the project, do the project, and put the asset into service. Put more succinctly, the sequence is ready, aim, fire.

The beginning of a project establishes a trajectory that is difficult to change once the project gains momentum. First, projects are progressively defined, meaning details are continually added to work that was done previously. Mistakes made in the technical design, project strategies, and foundational project scope tend to cascade through the entire project life cycle. Making changes later almost always leads to costly rework and mistakes from overlooked details.

Once a project builds momentum, it is also hard to stop even if the project has a marginal value. Projects build momentum as more individuals become invested in their outcomes. The business executives sponsoring the project are usually counting on the project to improve the business's financial performance. The technology group may be keenly interested in demonstrating its research commercially. The project manager and the rest of the project professionals also have a vested interest in the project continuing and often become advocates for the project. Projects also gain financial momentum as more money is invested to complete project definition. There is a reluctance to incur

the sunk costs from canceling a project just before full-funds authorization, when the full budget to complete the project is released to the project team. For example, the business may have spent a million dollars developing the project. Canceling the project means throwing away that money.

Executives throughout a company have a huge influence on how well the initial work on a project is done. My research shows that the early stages of the capital project life cycle tend to be done with less rigor and discipline than the later stages. Executives just do not pay enough attention to the formative stages of the project. The problem is a little like diet and exercise. We all know that a balanced diet and exercise are key ingredients to good health. Yet—as most of us know from personal experience—we do not always do what we know is right. To make the effort easier, I will provide practical guidance on what executives can do to improve results without overburdening them with work that adds no business value.