EVALUATING PROJECT SUCCESS

A look at a more holistic method of measuring project success

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ATTRIBUTIONS

Some information presented on these slides was obtained (with permission) from:

- **Evaluate Project Success** – Nat D. Schatz, Consultant, Chemical Engineering Progress, June 2018

- *…as well as over 35 years of experience in the chemical process industry!*

Project Success - Defined:

- **Traditional methods of determining project success usually take into account only whether the project met its budget and schedule**
- **Traditional parameters that define project success in the chemical process industries (CPI) include:**
  - *Cost*
  - *Schedule*
  - *Operability*
- **A more meaningful assessment would evaluate the impact of the project on the organization**
  - *determining project success by evaluating predetermined key performance indicators (KPIs) generates more meaningful, fair, and balanced post-project performance assessments*

Project Success - Defined:

- While many parameters and indicators have been used to determine project success, some companies do not have a consistent way to determine the parameters that should be applied to assess how a project met its goals and objectives, and how it impacted the organization in both tangible and intangible ways

- In this presentation two approaches to evaluate project success will be compared, and a way to implement a performance measurement tool to quantify project success will be recommended

Fair Evaluation of a Project

- **Project success is in the eye of the beholder and depends on the individual's function within the organization. For example:**
  - *the business sector evaluator is looking at corporate growth and sustainability*
  - *the engineering sector evaluator is considering the project's engineering objectives*
- **An imbalance in the assessment team could skew the assessment, which can create an unfair measurement of project success**
- **Because of these different and sometimes conflicting viewpoints, it is management's responsibility to utilize a methodology that will measure project success fairly.**

Fair Evaluation of a Project

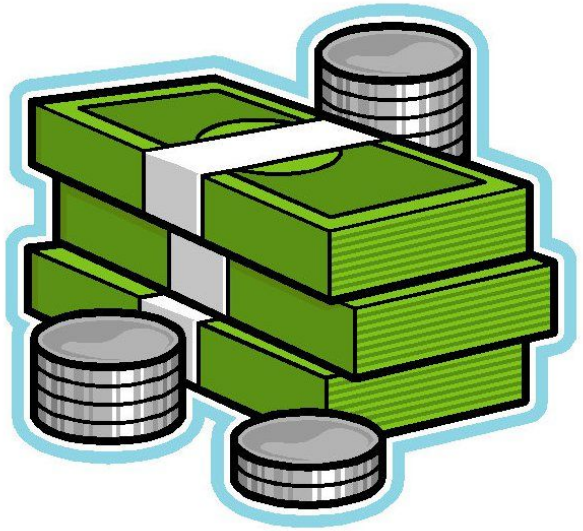
- **Rating project success fairly is important because it can impact the future of the organization's capital deployment**
  - *Often, a project's execution can serve as a model for future projects*
  - *However, project execution approaches may vary by project size, project location, and the availability and quality of personnel*
  - *In other words, one-size-fits-all is not always the best approach*
- **Rating project success fairly is also important because in many organizations, employees are rewarded or punished for their performance based on perceived project success**
  - *Individual contributions and can be ignored and strong performance may be overlooked on an unsuccessful project, even if the cause of perceived project failure was beyond the individual's control*
  - *When that happens, individuals are less likely to take calculated risks that may benefit future projects*.

Fair Evaluation of a Project

- **If a project is deemed a failure, some team members can suffer negative impacts to their reputations, confidence levels, and career growth and development**
  - *This can prompt highly talented people to leave the organization or, in some cases, cause them to never get another opportunity to display and develop their capabilities*
  - *In all of these cases, the organization suffers because of the erosion or underutilization of its talent*
- **If an upcoming project is similar to a past failed project, management may be hesitant to proceed with it, although the first project may have failed due to unique circumstances**
  - *If this happens, the company may be passing up perfectly good opportunities to increase revenue, market share, and operability*
- **In other words, one-size-fits-all is not always the best approach….**

The Traditional Approaches

- **The parameters that are traditionally used to measure project success are project cost, project schedule, and unit operability**
- **PROJECT COST: the measurement of the actual project costs vs. the authorized project budget, including change orders reflecting changes in project scope**
  - *Overruns negatively impact financial measurements such as payback, discounted cash flow (DCF), and internal rate of return (IRR), so there is validity in using this measurement*
  - *However, it has several drawbacks:*



The Traditional Approaches

- **One drawback is that project authorizations may be arbitrarily established or reduced because of profitability concerns, corporate budget allotments, unreasonably low initial project estimates, lack of understanding of contingency, etc.**
  - *In these cases, the project team is constrained by an unrealistic financial target that can lead to less-than-optimal decisions concerning project execution (for example, selecting the low bidder, who may provide inefficient operating equipment)*
- **If success is based on project cost, the project team might attempt to control capital costs by sacrificing operability and maintainability to meet an unrealistic budget, for example:**
  - *a project team might choose to accept a bid for pumps because of their low capital cost, but ignore their high operating costs*
  - *the team might select a material of construction to save capital costs when it would be best to select a more expensive material of construction that would last longer.*

The Traditional Approaches

- **The flip side of this is an overestimated project budget**
  - *Although everyone feels good about underrunning the budget, funds tied up in this project could have been appropriated to other projects with potentially higher paybacks.*
  - *In addition, an excessive authorization budget clouds the picture of both individual and team performance.*
- **Additionally, small projects are often managed as a portfolio**
  - *Excess costs for one project are transferred to a project that is under-running its budget*
  - *This relieves the project manager on the overrunning project of accountability*

The Traditional Approaches

- **PROJECT SCHEDULE is the measurement of the actual project duration vs. the authorized project schedule**
  - *In schedule-driven projects, management has committed to adhere to a specific schedule to start a revenue stream on time, enter the market with a new product, become the lowest-cost producer of the product, etc.*

The Traditional Approaches

- **IMPORTANT CONSIDERATION: If the project is cost-driven and not schedule-driven, spending additional funds to meet the schedule makes no sense. For example:**
  - *planned or spot overtime*
  - *the use of multiple shifts*
  - *premium payments to a supplier for earlier delivery*
- **The impact of some actions taken to correct a slipping schedule can change the project's critical path or, worse yet, create multiple critical paths**
- **The management of multiple critical paths is extremely difficult because it eliminates the projects team's freedom to make decisions.**

The Traditional Approaches

- **UNIT OPERABILITY can be defined in a few different ways, but for the purpose of this presentation, let's define it as how well the project met its operability goals, for example:**
  - *startup duration*
  - *startup costs*
  - *time to reach production requirements*
  - *product yields and quality*
  - *operating and maintenance costs*

The Traditional Approaches

- **Measuring project success based on unit operability has several drawbacks:**
  - *Market conditions at startup may differ from those estimated in the authorization document, causing the facility to operate at a suboptimal production rate*
    - » Although market conditions are beyond the control of the project team, lower production rates may reduce product yields, adding to costs and possibly affecting product quality.
  - *Changed market conditions may dictate a change in product quality, possibly affecting product throughput or requiring additional equipment. This also is beyond the project team's control*
  - *Some of the operating costs stated in the authorization document may increase during the duration of the project.*
    - » For example, a newly renegotiated labor contract may increase the unit labor rates higher than anticipated, or the inflation rate for raw material costs may have been underestimated.

The Traditional Approaches

- **In many cases, managers of the project engineering function take a narrow-minded view of the project's success parameters**
  - *They do not want to be responsible for operability because they believe it is beyond their control*
  - *However, in many cases, the performance of the project team can affect startup duration and operability*
    - » For instance, the misspecification of pump seals can lead to excessive shutdowns during the startup phase
- **BOTTOM LINE: The classical approach to measuring project success fails to answer the most important question:**

  Is the company better off after the execution of this project or not?
- **To answer this question, we need to examine additional parameters; both tangible and intangible, that paint a clearer picture of project performance…**

A Better Approach

A more-informative approach to measuring project success takes into account many additional parameters to assess project performance:

- **Customer Satisfaction:**
  - *Was the customer(s) satisfied with the unit provided by the project team?*
  - *Did it meet or exceed customer expectations?*
- **Vendor / Contractor Responsiveness:**
  - *Did the vendors and/or contractors respond to questions and inquiries in a timely and accurate manner?*
  - *Was the project impacted by a lack of responsiveness?*
- **Vendor / Contractor "Added Value":**
  - *Did the vendors and/or contractors add value to the project by offering suggestions for equipment selection, project execution planning, etc.?*
  - *Would this vendor/contractor qualify for work on future projects?*

A Better Approach

- **Quality of Installation:**
  - *How many change orders were issued and how much rework was required during construction and/or during the pre-commissioning and/or commissioning phases?*
  - *Was any redesign required during the startup phase to make the unit work?*
  - *Did the unit start up quickly and efficiently?*
- **Adequacy of Staffing:**
  - *Did the company staff key project functions with competent and motivated individuals who completed their assignments in a timely manner?*
  - *Did the contractors staff key functions with competent personnel as per the staffing plan?*
  - *Did a lack of competent personnel assigned to the project have any negative consequences'?*
  - *Was there excessive personnel turnover, and if so, why?*

A Better Approach

- **Adherence to Capital Execution Procedures:**
  - *Were the corporate project execution procedures adhered to during the project? If not, why?*
  - *Do the corporate procedures need to he modified as a result of the experience gained on this project?*
- **Mentoring:**
  - *Were the younger members of the project team properly mentored by the senior members of the team?*
  - *Are the younger team members now able to take on more responsibility because they worked on this project?*
- **Contingency Setting & Drawdown:**
  - *Was the contingency level of this project set by a detailed risk analysis (e.g., Monte Carlo analysis)?*
  - *Was it adequate for this project? Was contingency drawdown performed as per corporate procedure?*

A Better Approach

- **Adherence to Project Execution Plan:**
  - *Was a formal and management-approved project execution plan prepared for this project?*
  - *Was it adhered to and maintained during the project to accommodate changing conditions?*
- **Team Communication & Interactions:**
  - *Was a communication plan for this project prepared as part of the project execution plan?*
  - *Did it work in practice?*
  - *Did the project team members effectively work together to solve problems?*

A Better Approach

- **Clear project goals and objectives:**
  - *Was a project mission statement that defined high-level goals prepared?*
  - *Were goals and objectives delineated in the project execution plan?*
  - *Did everyone understand and accept those goals and objectives?*
  - *Were the goals and objectives periodically reviewed during the project execution?*
- **Project team's reaction to unforeseen situations:**
  - *How did the project team react to situations impacting cost and schedule that were not anticipated at the time of authorization?*
    - » For example, if a major piece of equipment was to be delivered later than required, did the project team take action and work with the vendor to bring the delivery date back to its original schedule?

Owner Performance Measurement Tool

- **The OPMT is a quantitative analysis technique that considers all important project parameters**
  - *At the beginning of the project, the stakeholders determine the parameters that will be used to measure the project and assign a weight to each parameter (such that the sum of the weights is 1)*
  - *Parameters with a higher weight are considered more important than parameters with a lower weight.*
    - » For example, if the project schedule is more important then project cost, the project schedule parameter will he assigned a higher weight than the project cost.
  - *After the project is completed, the project team gives each project parameter a score from 1 to 10 (or 1 to 5, in some cases), with 10 being the best and 1 being the worst on a 1-10 scale*
  - *To determine the overall score for the project, each parameter score is multiplied by its weighting, and the weighted scores are totaled*

Owner Performance Measurement Tool

- **The OPMT is a quantitative analysis technique that considers all important project parameters, continued**
  - *The overall project score is compared to specific performance criteria to determine project success. Typically, on projects with a 1-10 scale, scores above a 7 are considered successful*

Owner Performance Measurement Tool

- **The tool may be applied at four project milestones:**

  1. ***At the end of front-end loading*** *- i.e., the last phase of a project before authorization.*
     - » Certain activities and deliverables have been completed during this phase, such as piping and instrumentation diagrams, plant layout drawings, the equipment list with all equipment sized and specified, instrumentation index, etc.
  2. ***At mechanical completion*** *- this is attained when the plant is constructed according to design drawings and specifications and the equipment has been initially tested*
  3. ***After one year of operation***
  4. ***As part of the project audit*** *(final assessment)*

Owner Performance Measurement Tool

- **The scoring is typically performed at a meeting with all the project functions present**
- **The scoring is defined at the meeting, including the scale used *(typically 1-5 or 1-10)***
- **Criteria for the scoring are also defined at this meeting**
  - *For example, on a 1-10 scale, 10 could be **excellent**, 8 could be **very good**, 7 could be **good**, 5 could be **fair**, 3 could be **below average**, and 1 could be **poor***
- **For complex, strategic projects, an outside facilitator may be hired to organize and lead the meeting.**
- **After the scores are calculated, the results of the evaluation should be distributed to the project team as well as corporate management**

Example # 1 – Reducing Costs

- **A major chemical company built a new brownfield unit inside an existing plant that would reduce the cost of making the product**
- **The project was cost-driven, although schedule was important as well**
- **The capital cost of the unit was $40 million (10% above budget)**
- **Mechanical completion was attained within budget and schedule**
- **The unit started up on time and within the operating budget, and it began producing product within cost and with acceptable quality after two months of operation *(compared to the four months estimated in the project authorization)***

Example # 1 – Reducing Costs

- However, the original project manager and cost engineer resigned from the company at the beginning of the detailed engineering phase of the project
- Process engineering staffing was completed later than scheduled, so there were some design and cost changes
- Despite these set-backs, relationships between the project team and the operations staff were excellent during the project
- And, the business and plant management were very pleased with the unit
- Table 1 lists the OPMT results obtained after project startup
- For this project, the team agreed on the performance rating criteria of: Excellent = 9-10; Good = 7-9; Fair = 5-7; and Poor = <5

OPMT Assessment: Example # 1

Table 1. In Example 1, a company built a brownfield unit to reduce the cost of making product. Although the capital cost of the plant was 10% above budget, overall the project was a success.			
Parameter	**Weight (W), 0–1**	**Rating (R), 1–10**	**Total Score (W×R)**
Cost Compliance	0.15	5	0.75
Schedule Compliance	0.10	10	1.00
Operability	0.20	9	1.80
Technology Transfer	0.25	10	2.50
Contractor Selection	0.10	5	0.50
Project Team Communications	0.20	10	2.00
Overall Score	1.00		8.55

The score of **8.55** indicated that the project was a success with a good rating, despite the project cost overrun that may have reduced the project score using the traditional approach

The company added a valuable asset and gained experience with executing this type of project, while setting a positive example for project communications and relationships between the functions

Example # 2
Adding Manufacturing Capabilities

- A major European chemical company built a new green-field unit on the U.S. Gulf Coast that would give them North American manufacturing capability, and it would allow them to utilize a new technology that would reduce the cost of making the product
- The project was both cost- and schedule-driven
- The capital cost of the plant was $55 million (10% above budget)
- Mechanical completion was attained three months later than anticipated
- And, because of unusual cold weather affecting the operation and changes to the project design, the startup was completed six months later than anticipated.

Example # 2
Adding Manufacturing Capabilities

- **The team faced several major problems:**
  - *Technology was being developed during the project execution phase; thus, many design changes were made at or after startup*
  - *Contractor selection was not based on an objective analysis and was made by senior management on the basis of past experience with an engineering company on a previous unrelated project*
  - *The engineering contractor had no experience with this type of commodity product and was understaffed in many disciplines*
- **Much of their design work was redone by multifunction, multi-company field engineering staff that performed admirably under the circumstances**
- **In addition, the construction contractor was understaffed and several outside contractors were brought in to finish the work**

Example # 2
Adding Manufacturing Capabilities

- **Overtime was excessive because of understaffing, but was needed to complete the project with a minimum schedule delay**
  - *Three different project managers were responsible for the project at different times*
  - *Process-engineering staffing was completed later than scheduled*
  - *In addition, there were several changes in the lead process engineering position*
  - *However, relationships between the project team and operations were excellent during the project, and several project team members took production positions in the unit.*
- **Because of the cost and schedule delays, business and plant management were very unhappy with the project and considered it a failure**
  - *Eventually, 30% of the plant was sold to another company, with the original owner retaining operational rights and most of the marketing rights*.

OPMT Assessment: Example # 2

Table 2. In Example 2, a new greenfield unit faced some issues with budget and schedule overrun. Many of the project's problems were beyond the control of the project team.

Parameter	Weight (W), 0–1	Rating (R), 1–10	Total Score (W×R)
Cost Compliance	0.10	5	0.50
Schedule Compliance	0.10	4	0.40
Operability	0.25	6	1.50
Customer Satisfaction	0.20	3	0.60
Project Team's Reactions	0.20	10	2.00
Adherence to Project Execution Plan	0.15	4	0.60
Overall Score	1.00		5.6

The score of **5.6** indicated that the project had a fair rating, despite the project cost and schedule overruns that may have reduced the project score under the traditional approach.

Many of the project's problems were beyond the control of the project team, but despite this, the project team "brute-forced" the project to completion and eventually the company recovered part of the assets through the partial sale of the unit.

The OPMT also identified areas for improvement in future projects

Example # 3
Branching into New Markets

- A major chemical company built a new brownfield unit inside an existing plant that would reduce the cost of making multiple products, as well as gain access to additional markets through its strategic location
- The project was cost-driven, although schedule was important as well
- The capital cost of the plant was $22 million (10% above budget)
- Mechanical completion was 10 weeks late due to late equipment deliveries, delayed site preparation, and difficulties with bringing the control system online
- The unit started up on time and within operating budget, despite problems with poor pipe support design and difficulties in handling high-melt raw materials
- During the first six months, output was down to 50% of anticipated sales due to a business downturn.

Example # 3
Branching into New Markets

- The project met its goals of reduced batch cycle times, allowing the company to shut down four inefficient sites after 15 months of full operation of the new unit
- The project team remained intact for the project duration, and relationships between the project team and operations were excellent throughout the project.
- Construction was partially accomplished using modular construction, a first for this site. The business and plant management were very pleased with the unit.

OPMT Assessment: Example # 3

Table 3. In Example 3, a brownfield unit was installed that reduced batch cycle times and helped the company gain additional markets. However, mechanical completion was 10 weeks late and the capital cost was 10% above budget.

Parameter	Weight (W), 0–1	Rating (R), 1–10	Total Score (W×R)
Cost Compliance	0.10	5	0.50
Schedule Compliance	0.10	4	0.40
Operability	0.25	9	2.25
Customer Satisfaction	0.20	10	2.00
Project Team's Reactions	0.20	10	2.00
Contractor Added Value	0.15	8	1.20
Overall Score	1.00		8.35

The score of **8.35** indicated that the project was a success, with a good rating despite the project cost and schedule overruns that may have reduced the project score if only the traditional approach were considered.

The project team stayed intact and performed well, although late equipment deliveries and slower-than-planned site preparation delayed the project.

The OPMT also identified areas of improvement for the next project.

In Summary

- The detailed approach to project performance evaluation, along with a quantitative tool like the OPMT, yield a more holistic measure of project success than traditional approaches
- Using input from all company participants, it effectively measures the impact of the project on the company and reveals areas for improvement on future projects
- In addition, this technique can he applied to a variety of project types.


The End

"There is no expedient to which a man will not resort to avoid the real labor of thinking."

Sir Joshua Reynolds

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