IPA

Independent Project Analysis Newsletter

Independent Project Analysis, Inc. is the preeminent organization for quantitative analysis of capital project effectiveness worldwide. At IPA, we identify Best Practices to drive successful project outcomes.

Volume 10, Issue 3 SEPTEMBER 2018

Also in this issue:

IPA Adds Key Project Team Member Turnover Metric to PES

By Jovan Giaimuccio, PhD*, IPA Senior Analyst and PES Product Champion*

Independent Project Analysis (IPA), Inc. wants owner companies to fully recognize that turnover of certain capital project team leaders during a project's development and execution is likely to have harmful effects on the project's execution performance. A new IPA Project Evaluation System (PES)®[1] metric, the Key Project Team Member Turnover Metric, is designed to make companies take notice.

IPA research studies have shown the harmful effects of project team member turnover and the focus, historically, has been on project manager turnover. At the Industry Benchmarking Consortium (IBC) in March 2018, IPA's Chief Operating Officer Elizabeth Sanborn presented new research showing that recently completed projects with construction manager and engineering lead turnover experienced diminished cost performance. In addition, the cost performance of projects with turnover was more varied.

In recent years, turnover has been common in three capital project leadership roles—project manager, construction manager, and lead engineer. Of the most recent completed client projects IPA evaluated in 2017, less than half, 44 percent, did not experience turnover in any of the three project leadership positions. The rest, 56 percent, experienced turnover of one of these positions with 42 percent experiencing turnover in the project manager position and 22 percent and 31 percent experiencing turnover in the lead engineer and construction manager positions, respectively. As many as 17 percent of the recently completed projects had two of the three key team members leave the project during the delivery process. Turnover in all three key team member positions occurred 8 percent of the time.

continued on page 2

continued from page 1

Companies are having a difficult time finding experienced project leaders, especially construction managers, and this makes matters worse. Industry-wide, retirements and departures over the last few years have drained the already shallow pools of project leadership talent.

IPA has focused significant effort in identifying the characteristics that support project personnel being successful in their roles—specifically in the project management, construction management, and lead engineer roles. This work has been translated into services that can be used to support selecting the right leaders early in their careers and identifying the right opportunities to move them up the learning curve more quickly.

For questions regarding the Key Team Member Turnover metric, please contact Jovan Giaimuccio, IPA's PES Product Champion, at jgiaimuccio@ipaglobal.com.

IPA's PES—Proven and Trusted

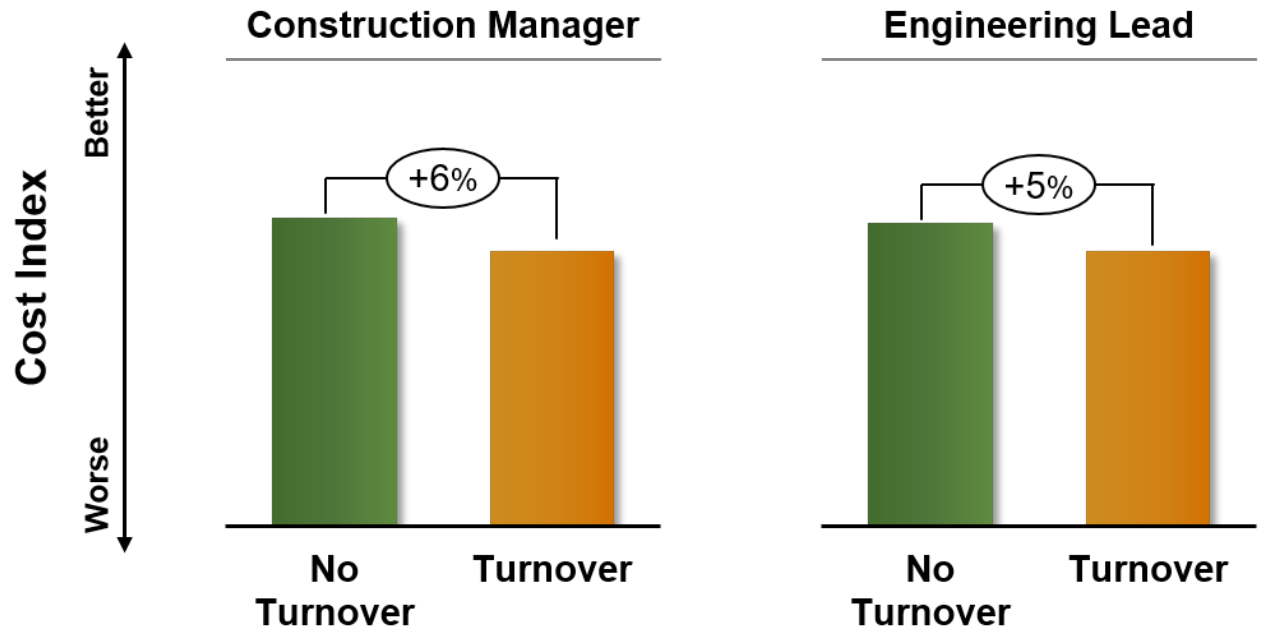
Drawing on IPA's unparalleled projects, teams, and organizations databases, IPA's Project Evaluation System (PES) is used by companies to benchmark your capital project system against competitors, optimize your project teams and allocate the right people for your portfolio; identify specific work process gaps to align with Industry Best Practices, and strengthen relationships with partners to produce excellent business assets.

IPA continually adds new and expands on existing capabilities comprising the PES, as is the case with the key Project Team Member Turnover Metrics featured in this newsletter.

Contact IPA PES Product Champion Jovan Giaimuccio for more information.

[1] PES is a registered trademark of IPA.

Effect on Cost of Key Team Member Turnover



Based on IBC 2018 dataset controlling for FEL

IPA Launching New Tank Maintenance Capital Project Study

Companies in the petroleum, petrochemical, and transportation industries must routinely clean, inspect, and repair their numerous storage tanks. Although not revenue-generating efforts, tank maintenance capital projects can be costly to execute. Executing tank maintenance efficiently by reducing cost and downtime is vital.

IPA developed detailed cost and schedule metrics for tank maintenance projects in its first Benchmarking Tank Maintenance Study completed in 2014. Several major refining/transportation companies in the United States are now using these metrics to measure their tank maintenance project execution performance. IPA is now preparing a second tank maintenance study to benchmark cost and schedule competitiveness and predictability against other industry tank maintenance projects. The study is open to new petroleum, petrochemical, and transportation owner companies.

The study will update the metrics from the 2014 study and collect additional project information. The additional information will entail factors that drive performance and the approaches used to maintain tanks. The study will also review tank maintenance project practices that affect project outcomes.

The study will answer the following key questions:

- What metrics do companies use to measure cost and schedule performance?
- What are industry norms for these metrics?
- How does each company's tank maintenance program compare, in terms of cost and schedule competitiveness and predictability, to industry norms?
- What high-level organizational and project management practices are applied to these programs?
- What maintenance and inspection technologies and methods are currently employed?

For more information about this study, please contact IPA Advanced Associate Implementation Analyst Josh McClellan at jmcclellan@ipaglobal.com.

IPA improves the competitiveness of our customers through enabling more effective use of capital in their businesses. It is our mission and unique competence to conduct research into the functioning of capital projects and project systems and to apply the results of that research to help our customers create and use capital assets more efficiently.

Two Common Barriers for Chinese-Funded Capital Project Investments in the U.S.

By Greg Ray, *IPA Senior Project Analyst*

Like other foreign investors, Chinese-owned companies are likely to experience a learning curve when investing in capital projects located in the United States. With the cost of labor, permitting requirements, and other localized requirements varying from region to region across the United States, each investment by a Chinese-owned entity is likely to face its own unique set of challenges.

Despite reports that Chinese foreign direct investment (FDI) decreased substantially in 2017 following years of steep FDI increases, there are a variety of reasons why Chinese companies will continue to spend capital to develop assets in the United States. Among these reasons are access to financing in China, wage inflation and labor shortages due to China's rapidly aging population, global brand building, and investment diversification. There is, of course, also the current administration's enthusiastic endorsement of those multinationals who invest for production in the United States as well.

IPA works together with client executives, project organizations, and project teams to address common areas of difficulty that get in the way of delivering successful capital projects globally. For Chinese-owned companies investing in the United States, IPA observes two areas that commonly disrupt capital project performance. One area of difficulty is accurate cost estimating and contingency setting for capital projects. Another is adherence to U.S. construction safety requirements and Best Practices for construction safety without eroding capital effectiveness.

Accurate Cost Estimating and Contingency Setting

Cost estimating and setting contingency for a capital project in a new location is difficult. Chinese owner companies normally have an especially difficult time with contingency setting, as the predominant contracting strategy in China is to use small owner teams with a single, all encompassing, lump-sum engineering, procurement, and construction (EPC) contract. The contractor—typically a sub-company of the State Owned Enterprise (SOE) in the public realm—builds the cost estimate and sets the contingency for the project. However, when approaching projects in the United States, this is not possible because Chinese owners cannot transpose their EPC contractors onto U.S. soil to execute projects. Best Practice is to set contingency based on a large number of factors, including key equipment risk, project execution planning, construction labor availability, and bulk material risks for the project location. This is very difficult to do remotely.

However, it is not just about setting contingency. Local risk factors unique to different regions of the United States make capital project cost estimates difficult for most foreign owner companies. IPA's global capital projects database of more than 18,000 onshore projects contains detailed cost information from thousands of completed projects across the United States. With these data, IPA is able to assist owner management and project teams to perform detailed statistical analysis of their project cost estimates. Using IPA's proprietary statistics models for both cost capacity and effectiveness, IPA can give business and project professionals a better understanding of how their

overall cost targets compare to the industry average costs in the U.S. region. The IPA analysis explains which cost categories are budgeted higher (or lower) than competitors who have completed similarly scoped projects.

Beyond the data-based cost analysis, IPA works with clients to perform a qualitative project cost estimate review that involves examining the Basis of Estimate and assesses all key assumptions made during estimate development. IPA reviews each major input into the estimate, including the methods used to estimate the equipment, bulk materials (quantity take-offs and prices), construction labor costs (basis for wages and productivity), project management, construction management, and detailed engineering costs. In addition, IPA considers the use of allowances, contingency, and escalation in its cost assessment. IPA research has shown that estimates prepared using Best Practices, in combination with a closed scope, are significantly more precise, better centered, and more competitive.

U.S. Construction Safety Performance

Unlike the practices China owners use to build projects in other world regions, there is no possibility of transporting Chinese EPC firms together with their construction labor workforce across the ocean to complete projects in the United States. It is not possible to bring “local norms” for construction practices into the various regions of the United States, so Chinese companies must familiarize themselves with the required local construction safety practices. IPA has extensive research on construction safety Best Practices and has identified the key practices that are essential to reducing the risk of safety incidents on projects. IPA works with project teams prior to authorization to ensure that construction safety Best Practices are clearly understood, have been planned for, and will be implemented as projects enter execution.

In addition, using proprietary statistics models, IPA helps clients to understand the risk of encountering safety incidents based on the total field labor hours and what has been experienced by completed projects in Industry. In this way, project leadership and stakeholders are made more aware of the potential for encountering safety incidents and can plan accordingly for additional safety support on projects in which there is a high probability of occurrence.

There are many other difficulties that Chinese companies and other foreign investors regularly encounter that are unique to investment in the United States and the rest of North America. Such difficulties include construction management approaches, local contracting strategies, and project staffing and function competency assessments. With the right capital project evaluation experience, data, and knowledge of Best Practices, Chinese owner companies can take proactive actions to increase the effectiveness of the capital spent in the United States.

For more information, contact IPA Senior Project Analyst Greg Ray at gray@ipaglobal.com.

Community of Practice Membership Open to Mid-Sized Chemicals Companies

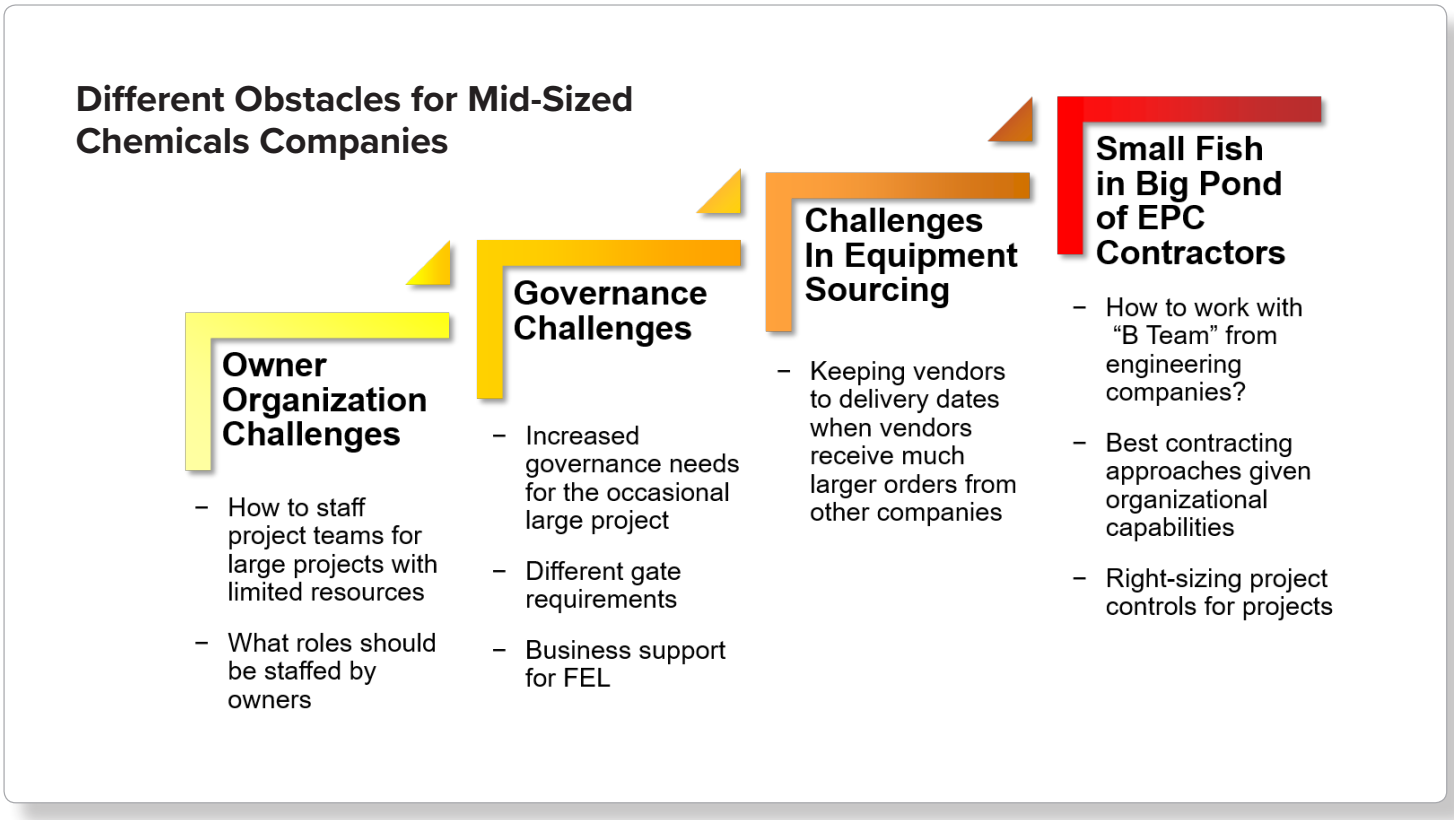
Mid-sized chemicals companies are invited to join a community of practice (CoP), launched by IPA last year, to share ideas and practices for improving the performance of their capital projects.

Dubbed the Mid-Sized Chemicals Company CoP, the IPA-led group seeks to build on the success of the first year of the CoP, which generated interesting insights into the challenges mid-sized chemicals companies are facing today in delivering capital projects. In general, CoP members want to look at how capital project execution and development practices followed by large chemicals companies might be tailored to benefit smaller project groups.

"Mid-sized chemicals companies feel they are at a disadvantage compared to companies with much bigger capital expenditure budgets and project portfolios," IPA Senior Project Analyst and CoP Coordinator Lara Keefer said. "Their smaller projects might be regarded by EPC contractors as small fish in a large pond, but getting these projects right can be vital to a mid-sized company's future."

The goal of the CoP is twofold, according to Keefer. The first is to continue the working group's practice of sharing information and project experiences and shining a brighter light on the challenges mid-sized chemicals companies face in their efforts to deliver capital assets. The second is to leverage IPA's experience evaluating and conducting research on larger chemicals projects to identify how small project teams can increase the cost competitiveness of their own projects. In extending an invitation for other mid-sized chemical companies to join the CoP, current member companies hope to establish a knowledge-sharing body that can agree on areas worthy of more extensive capital projects research.

In its inaugural year, the CoP decided to survey mid-sized companies' use of project controls. IPA analyzed the information from the short survey and then compared it with a subset of high-level chemicals performance metrics from IPA's database. The projects ranged in value from roughly US$0.1 million to US$20 million.



The survey revealed various approaches to staffing project controls and how the project controls function supports projects. The survey results were shared with all participants. IPA has agreed to continue to facilitate CoP meetings and assist in steering discussions that might result in future project evaluations and areas of research. Challenges in the areas of capital project governance, organizations and teams, and contracting are potential areas of further investigation.

IPA has more than 30 years of experience conducting capital project evaluations and research and counts global industry leaders in the chemicals industry and other processing industrial sectors as well as many smaller owner companies among its clients. IPA maintains a proprietary capital projects database containing detailed data from more than 18,000 projects located worldwide—many of them chemicals projects—ranging in value from less than $1 million to several billion dollars.

If you would like to join this group or want to be part of the next survey group, please contact Natalia Zwart, Manager, IPA's Chemicals, Life Sciences, and Nutrition, at nzwart@ipaglobal.com.

Chemicals Capital Project Evaluation Experts

Capital effectiveness is essential for survival within the chemicals sector, which is marked by narrow profit margins, intense competition, and unpredictable investment cycles. IPA's chemicals business area, covering both commodity and specialty chemicals, benchmarks and evaluates the performance of capital projects and project systems. Our work provides valuable insight into how well an individual project is poised for success and how well a project system is delivering projects that meet business needs that have predictable, yet competitive results.

IPA not only measures performance outcomes, but also diagnoses the root causes of poor or variable outcomes. This information is then used to make timely adjustments to individual project and investment decisions and drive improvements to project work processes, governance structures, and project organizations. Over time, IPA's work closes the loop on continuous improvement by measuring the effect the changes have had on project outcomes.

UCEC 2018 Participants Acquire Latest Cost Estimate Validation Metrics, Review New Industry Research

IPA hosted the Upstream Cost Engineering Committee (UCEC) annual meeting on June 20, 2018, in Houston, Texas. Oil and gas asset development cost groups representing nearly a dozen upstream companies, including majors and independents, attended UCEC 2018. The UCEC is a subcommittee of the Upstream Benchmarking Consortium (UIBC), a group of owner operators committed to improving the capital effectiveness of their capital projects. IPA facilitates both the UCEC and IBC.

The UCEC helps owners improve upstream project and business results by providing metrics for better cost engineering. The metrics produced by the UCEC can be used to support conceptual estimates and schedule development, estimate and schedule reviews, and calibration and improvement of company tools and databases. The metrics are useful in assessing a company's performance against industry norms. UCEC participants include IPA client representatives who have a common interest in cost engineering and cost metric development.

But the UCEC is more than just about discussing metrics. With guidance from UCEC member companies, IPA develops tools for owner cost engineers to better support the development and validation of cost and schedule estimates. Networking opportunities are also afforded to UCEC participants. In addition, the committee sponsors research studies that examine critical topics of interest to upstream cost engineering professionals. Each year, UCEC steering committee members recommend topics for IPA to examine; the research topics presented at UCEC 2018 are summarized below.

Location Differences in E&P Facility Development: Recognizing "dramatically different project costs for a given scope" depending on a project's location, the study set out to quantify location differences in facility development and identify reasons for the cost differences. More specifically, the study examined areas of higher and lower wage rates, fabrication costs, and the effects of local content requirements for the delivery of fixed platforms and subsea assets. The purpose of the study is to allow E&P companies to better validate early asset development estimates by leveraging regional cost difference insights.

Schedule Quality as a Driver of Project Outcomes: Project schedules are an integral part of establishing a basis for project execution. They serve to aid in understanding the time needed to execute a project and shed light on associated costs. But are there other ways that a schedule benefits a project team? The study pulled project schedules apart, analyzed their basic components, and then looked at how the overall quality of a schedule drives outcomes. A novel measure of schedule quality resulting from the study gives companies an improved means of gauging drivers of schedule slip and cost growth.

Industry Dollar per Ton: The study provides companies with more granular metrics for developing offshore facilities, including metrics for better estimates of Front-End Loading (FEL) and project management costs, topsides and substructure fabrication costs, and hook-up and commissioning service costs.

For more information about the UCEC, please contact E&P Research Team Lead Jonathan Walker at jewalker@ipaglobal.com.

IPA Hosts Inaugural Airports Project Benchmarking Research Consortium

Independent Project Analysis (IPA), Inc., recently hosted senior executives of major national and international airports at a first-of-its-kind forum focusing on the capital effectiveness of airport projects. At the IPA Airports Project Benchmarking Research Consortium, airport executives responsible for large capital projects, including at airports near New York, Washington, and London, reviewed the challenges of ensuring authorized capital can return promised stakeholder value. The event took place September 13 and 14, 2018, in Leesburg, Virginia.

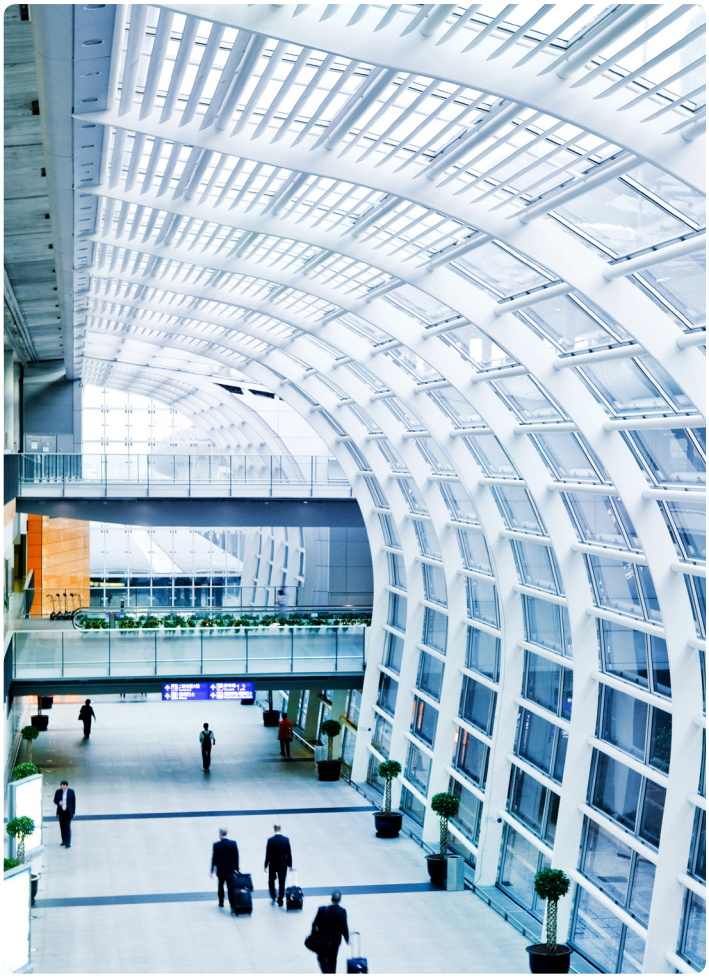
Airports around the world are authorizing tremendous amounts of capital for the construction of new and improved assets, including runways, terminals, and flight operations facilities. Such airport projects are often more challenging than their size or technology would suggest, due to complicated logistics, extensive security requirements, and a complex set of stakeholders. However, airport projects are not regularly benchmarked to determine whether the capital invested produced the desired outcomes, including for safety and for cost and schedule performance. IPA believes airport industry executives stand to benefit from sharing ideas about common ways to improve the effectiveness of capital projects in the airport industry through benchmarking Key Performance Indicators (KPIs), as well as by evaluating project system efficiency and execution practices.

On the forum's first day, participants were given an overview of how airport projects have performed in recent years. Participants then reviewed IPA's airport benchmarking approach and capabilities. This session framed areas where IPA's benchmarking data are strong and identify opportunities for the development of capabilities to measure performance more accurately. IPA then presented research on the topics, including reasons megaprojects fail so frequently, cost estimating practices that affect project outcomes, and the practices that can bolster a project team's capability for coping with limited resources. Each session leveraged IPA's extensive capital projects database.

On the second day of the event, participants reviewed how to effectively structure the terms and conditions for project contracts and how certain terms and conditions can affect risk. The final session on the consortium's agenda was an IPA-led workshop that sought consensus on the types of projects/scopes for future benchmarking, to align on research objectives, and to set expectations and goals for future collaboration.

Airport officials interested in learning more about the consortium and the challenges facing owner airport companies today are encouraged to contact IPA.

For more information, email IPA Advanced Research Analyst Melissa Matthews at mmatthews@ipaglobal.com.



Call for Participation: MMM Sector Sustaining Capital Expenditure and Allocation Research Study

Sustaining capital expenditure in the mining, minerals, and metals (MMM) industries is being subjected to ever more scrutiny following a long period of low commodity prices. With capital activity increasing within the sector in recent years, sustaining capital is important to ensure competitiveness and to free up cash flow for future investments. At the request of its clients, Independent Project Analysis, Inc. (IPA) proposes to update its groundbreaking 2013 MMM Sustaining Capital Study.

Study Objectives

The 2013 study established sustaining capital expenditure norms at an aggregate level and shed light on allocation practices, based on asset value, annual deprecation, and other operating asset characteristics. The results helped participants benchmark their expenditure levels and supported plans for expenditure optimization and continuous improvement of overall capital efficiency.

The objectives of the 2018 update to the MMM Sustaining Capital Study are as follows:

- Determine recent sustaining capital expenditure trends
- Update norms for sustaining capital spending by facility type
- Revisit planning and development methods employed to determine and manage sustaining capital requirements
- Investigate asset-specific (site or system) drivers for sustaining capital spending

Benefits

The study update will enable participating companies to:

- Compare sustaining capital expenditure and associated practices to industry norms
- Identify opportunities to improve capital efficiency

For additional information and to express interest in the study, please contact IPA Australia Director Petros Kapoulitsas at pkapoulitsas@ipaglobal.com.

THE IPA INSTITUTE

2018 Public Course Schedule

Visit www.ipaglobal.com/public-courses to view full course details and to register.

Project Management Best Practices (16 PDUs)
September 25-26 Houston, Texas
October 9-10 Bangkok, Thailand

Best Practices for Site-Based Projects (16 PDUs)
October 9-10 Rio de Janeiro, Brazil
October 23-24 Orlando, Florida

Complex Projects—Concepts, Strategies, and Practices for Success* (22 PDUs)
November 6-8 London, United Kingdom

**Instructed by IPA Founder and President Edward Merrow*

Best Practices for Mining Projects (16 PDUs)
November 28-29 Santiago, Chile

IPA Events and Presentations

Cost Engineering Committee 2018

September 18-19,
McLean, Virginia

The Cost Engineering Committee (CEC) is a working subcommittee under the Industry Benchmarking Consortium (IBC) that assists cost engineers by providing metrics and tools that offer an unbiased snapshot of industry cost and schedule estimates and trends. The CEC focuses on all aspects of cost (or investment) engineering, including cost estimating, scheduling, and project control practices and metrics, with the goal of expanding the owner's cost engineering capabilities. The primary vehicles for accomplishing these objectives are validation metrics, Best Practices research, and practice sharing. Contact IBC Director Andrew Griffith at agriffith@ipaglobal.com for more information.

Rio Oil & Gas Conference

September 27
Rio de Janeiro, Brazil

IPA Regional Director of Latin America Astor Luft will deliver a presentation on the subject of understanding the challenges of offshore decommissioning projects at the Rio Oil & Gas Conference. Decommissioning offshore E&P assets has been a focus for numerous international regulators, but not for operators. The size and number of offshore structures requiring decommissioning has increased globally, and regulators are imposing more stringent requirements. For more information, visit http://www.riooilgas.com.br/.

TAPPI PEERS Conference

October 28-31, 2018
Portland, Oregon

IPA Advanced Associate Project Analyst David Mead will participate in a Project Management Panel Discussion on how to best manage risk to meet project objectives in the execution of Pulp and Paper sector capital projects. Discussions will include a comparison to industry average of pulp and paper sector project outcomes and how gaps in definition drive worse outcomes. For more information, visit https://www.tappi.org/Events/Event-Calendar/PEERS-2018.

Upstream Industry Benchmarking Consortium

November 12-14,
Leesburg, Virginia

The Upstream Industry Benchmarking Consortium (UIBC) is solely dedicated to the exploration and production (E&P) industry. It provides an independent forum for each participating company to view key metrics of its project system performance, such as for cost and schedule, Front-End Loading (FEL), and many others, against the performance of other companies and share pointed and detailed information about their practices. The consortium highlights Best Practices, reinforcing their importance in driving improvements in asset development and capital effectiveness. Consortium attendees learn how to improve specific elements of capital project execution through presentations and other more interactive discussions. For more information, contact IBC Director Andrew Griffith at agriffith@ipaglobal.com.

AACE Brazil Conference on Cost Engineering

December 6-7,
Rio de Janeiro, Brazil

IPA Advanced Associate Research Analyst Melissa Matthews will deliver a presentation of the quality of capital project cost estimates at an AACE Brazil Conference on cost engineering. During her presentation, Matthews will explain how IPA has established the effect of estimate quality leading indicators on cost growth, and developed the real estimate ranges Industry has observed based on the quality of the estimate.

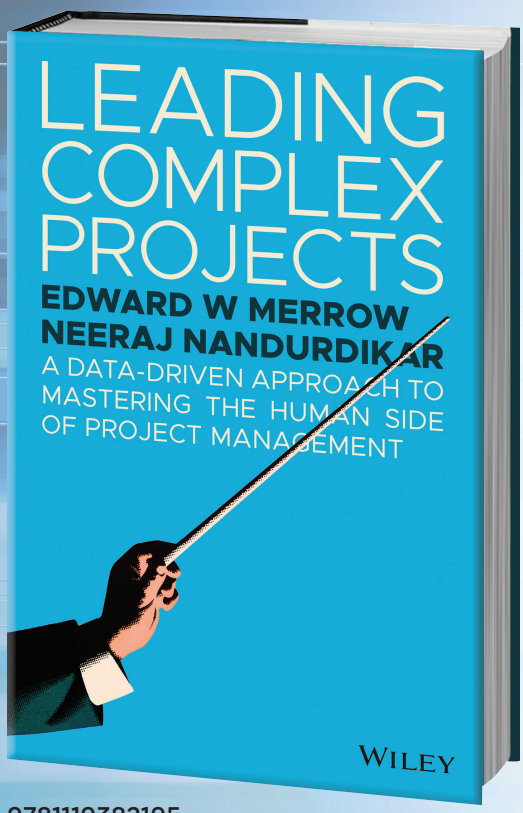
Procurement & Contracting Committee

December 12-13,
The Woodlands, Texas

The Procurement & Contracting Committee is a new Industry Benchmarking Consortium (IBC) sub-committee that will focus on quantifying relationships between industry procurement practices and capital project performance. Like members of IBC's cost engineering committees, PCOM member companies will benefit from metrics and research developed from IPA's proprietary database of more than 18,000 capital projects. The inaugural meeting will take place December 12 to 13, 2018, in The Woodlands, Texas. For more information, contact IPA Director, Project Research Division, Mike McFadden at mmcfadden@ipaglobal.com.

UNDERSTANDING PROJECT LEADERS

THEIR BACKGROUNDS, PERSONALITIES, HABITS AND HOW THAT EXPLAINS PROJECT SUCCESS OR FAILURE



9781119382195
Hardcover • $40

There are literally thousands of books on project *management*. But there are almost no books on project *managers,* the people who actually organize and lead projects to fruition. *Leading Complex Projects* fills that void and takes a unique approach to examine the leaders to whom we entrust our most important capital ventures. For the first time, personal leader characteristics are quantitatively linked to project outcomes through a major global study investigating the role of the leader in the success and failure of complex industrial projects. Using hard data on early years, backgrounds, education, experience, personality and temperament, and habits of mind, the authors connect the dots between project leaders and project success. They then dive into detailed profiles of 7 of the best leaders who share their stories of development and success. This book will help organizations learn what to look for in future complex project leaders and how to screen for and select future leaders to improve chances of successful projects.

The role of leadership is to generate *followership*—genuine cooperation from those who are not required to follow—to deliver a vision and successful outcomes. This means using their personality, emotional intelligence and prior experience to focus on the right tasks to generate successful outcomes. This book provides a wealth of practical, empirical and field-proven insights to help current or future leaders to hone their skills to generate the followership necessary for successful outcomes.

- Understand the shortcomings in our current leader selection models
- Examine and learn from the personalities, experience, background, and habits of mind and tasks of over 100s of project leaders
- Understand the causal pathway of how a leader's personal characteristics and traits translate into the tasks they do (or choose not to do) and how that links to outcomes
- Get to know 7 very successful leaders from 6 global organizations through their detailed profiles

Drawing a database of complex industrial projects from around the world, this book provides a solid basis for a quantitative understanding of the human side of project management — the role of the leader. Although a majority of the complex project data is taken from projects in the petroleum industry, the insights gleaned from the analysis are widely applicable across industrial sectors for current or future leaders and organizations of any stripe. *Leading Complex Projects* provides clear, data-backed improvement guidance for anyone in a project leadership role.

EDWARD MERROW is the founder and CEO of Independent Project Analysis, Inc., the world's leading consulting firm, evaluating billion-dollar "mega-projects" of national and international oil, chemical, pharmaceutical, and major mineral companies, benchmarking their cost, schedules, safety, startup and operational performance. Before founding IPA in 1987, Merrow was a research analyst and later the director of the Energy Policy Program at the Rand Corporation.

NEERAJ NANDURDIKAR is currently Director of IPA's Exploration and Production (E&P) global advisory business. Neeraj has spent the past 15 years providing strategic advice to EVPs, VPs, Heads of Projects, and Functional leaders of more than 30 different oil and gas operators around the world ranging in topics from reservoir and well construction best practices, to portfolio optimization, to organizational design and work process improvement to optimizing production performance.

Available wherever books and ebooks are sold.
IPAGlobal.com | IPAinstitute.com

WILEY