

IPANewsletter

IPA



IPA Unveils Tools for Improving the Carbon Competitiveness of Capital Projects

The pace with which energy, refining, chemicals, mining, and other industrial sector companies are investing in projects to reduce their carbon footprints is quickening. Decision makers understand that successful decarbonization projects are imperative to the implementation of high-profile corporate sustainability initiatives. Lowering the carbon intensity of projects is the right thing to do, but the question decision makers rightly ask is: “At what price?”

An IPA assessment of lower-carbon projects shows that business leaders are having a difficult time determining how they can strike the right balance between (lower) carbon intensity and project costs. Data from decarbonization projects IPA has evaluated over the last two years show that projects either meet lower carbon-intensity expectations but end up costing significantly more than promised, or the projects are cost competitive but fall short of their carbon reduction goals. Part of the reason for the uneven outcomes is that decision makers lack standardized tools rooted in real project outcome data to support their investment decisions.

Recognizing the need for business and project teams to quickly access the independent and reliable information necessary to assess the competitiveness of lower carbon projects, IPA has added new capital project assessment capabilities to its portfolio. IPA has also developed a new assessment readiness framework designed for greenhouse gas (GHG) emission reduction projects.

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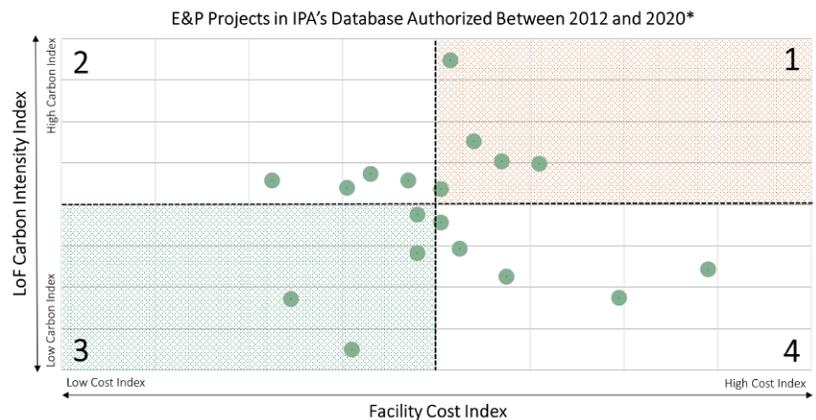
IPA improves the competitiveness of our customers through enabling more effective use of capital in their businesses. It is our mission and unique competence to conduct research into the functioning of capital projects and project systems and to apply the results of that research to help our customers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



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The **Carbon and Capital Effectiveness (CCE) Index** helps business and project teams compare low-GHG development options against the industry average as well as a portfolio of opportunities. According to IPA Associate Project Research Analyst Adi Akheramka, the lead researcher for low-carbon evaluation metrics, the CCE metric empowers project teams to present the business with an optimal balance between the cost and carbon competitiveness for a development concept (**Figure 1**). Teams can understand the trade-offs between carbon intensity and facility cost values derived from IPA's actual project data. They can also weigh how individual low-carbon opportunities compare with other opportunities in their company's portfolio and other similar opportunities in the industry.

Trade-Off Between CAPEX and Carbon Intensity Needs to Be Optimized



*Includes only projects by companies in the Joint IPA-Industry Decarbonization Working Group for which cost and carbon performance were evaluated.

Figure 1

The CCE metric is built on a separate new metric that leverages proprietary data to measure the carbon performance of projects, IPA's **Life of Field (LoF) Carbon Intensity** metric. The *LoF Carbon Intensity* metric serves as a pre-concept select tool for target setting, concept screening, and early estimate benchmarking of opportunities independent of their design characteristics. More than a half dozen national and regional standards and methodologies for estimating carbon dioxide equivalent (CO₂eq) emissions were reviewed to normalize the data from different companies as part of IPA's research, Akheramka said. IPA's pre-concept select tool provides both industry average absolute CO₂eq emissions and carbon intensity in kg CO₂eq/BOE (e.g., kilograms CO₂eq per barrel of oil equivalent).

The CCE and LoF Carbon Intensity Index metrics were incorporated into IPA's **Decarbonization Readiness Assessment Framework**. The framework can aid teams with assessing the maturity of their GHG estimates and guide the use of effective practices for the deployment of lower carbon-intensive asset developments. According to David Rosenberg, IPA Senior Research Consultant, the framework is meant to allow individual project teams to "effectively employ GHG and carbon reduction practices to deliver low carbon-effective capital projects."

The metrics and tools, presented for the first time during a virtual Upstream Industry Benchmarking Consortium (UIBC) 2020

presentation, were developed in collaboration with the Joint IPA-Industry Carbon Working Group organized by IPA. The group kicked off its work earlier in 2020 with a project decarbonization survey that highlighted gaps between corporate visions and “on-the-ground project readiness” of planned capital investments.

The metrics and framework are ready for use by teams working toward delivering low-carbon projects in the upstream oil and gas sector. IPA is currently working to extend the application of the metrics to support

project teams responsible for optimizing carbon competitiveness and capital effectiveness in the chemicals, refining, mining, and other sectors. The IPA tools enable businesses to evaluate projects at the critical concept select stage, early enough to enable change to help control carbon and cost performance.

Contact Adi Akheramka at aakheramka@ipaglobal.com for more information.

–By Geoff Emeigh, IPA Staff Writer

Breakbulk Magazine Features IPA Capital Project Experts

The latest issue of Breakbulk magazine, the industrial project supply chain trade publication, includes two articles featuring Independent Project Analysis, Inc. (IPA) experts. In a piece titled “Moving Energy Parts,” IPA Energy Practice Director Neeraj Nandurdikar offers insights into how the breakbulk industry must adapt to a rapidly changing energy sector.

The second article features IPA Senior Research Analyst Christos Lampris, who discusses IPA’s multi-client research into the competitiveness of large capital projects in China.

Visit www.ipaglobal.com to access the full articles.



IPA Co-Authors Article on Regional Risks to Delivering Capital-Effective Petrochemical Projects

The Society of Petroleum Engineers’ (SPE) Oil and Gas Facilities newsletter recently published an article on the risks to delivering capital-effective petrochemical projects, featuring contributions from two Independent Project Analysis (IPA) Project Research Division leaders. Mike McFadden, IPA Director, Project Research Division, and Jason Walker, Principal Deputy Director, Project Research Division, co-authored the article with Ian Deakin of Saudi Aramco and Mark Cudmore of Wood PLC.

Visit www.ipaglobal.com to learn more and access the full article.



Digitalization: New Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group Launches

IPA and MIMOSA Team Up to Help Accelerate Delivery of Vendor Neutral Digital Standards for Project Applications

By Geoff Emeigh, IPA Staff Writer

The Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group, a new working group co-led by Independent Project Analysis (IPA) and MIMOSA, aims to facilitate the interoperability of digital tools used to develop and execute industrial-sector capital projects. The working group kicked off via a webinar with more than 100 participants on November 4, 2020, with its leaders reviewing the capital projects industry’s uneven digitalization and standardization progress. Other industries, by contrast, have made significant strides in delivering compatible and user-friendly software and applications to gain work process efficiencies. The working group also seeks alignment on an approach for achieving digital interoperability and standardization from the beginning to the end of the capital project lifecycle. Working group participants—representing owner companies, EPC (engineering, procurement, and construction) firms, and international standards groups—are asked to lend their guidance and support to the ecosystem’s creation.

Owner companies’ project organizations have been pushing digital tools to “increase the volume, accuracy, and speed of information project teams need for key decision making,” IPA Capital Solutions Director Deb McNeil said during the working group’s first virtual meeting. However, whereas digital optimization is credited for making marked improvements to existing operating processes in other business sectors, capital project systems have not seen similar wide-scale opportunity gains. The global capital projects industry as a whole has not appreciably improved the cost and schedule competitiveness of projects for more than a decade (Figure 1). The industry has largely been unable to leverage digital tools to unlock efficiency gains that could result in better project cost and schedule performance.

IPA-led owner company surveys have provided insights into what owners want from their digitalization investments and where project system development and implementation challenges lie today. Nearly half of the owners IPA has surveyed say they would benefit from having technologies that could enhance work progress visibility and information flow, McNeil said. Another 40 percent say information system upgrades might lower project costs or speed up construction. But owners struggle to deploy digitalization programs and projects.

Capital Efficiency Has Not Improved in the Projects World
Is Digitalization the Answer?



Figure 1

2020 Digitalization Plan – July 2020 Survey Results
The 185 Digitalization Projects Are Dispersed Across the Project Life Cycle

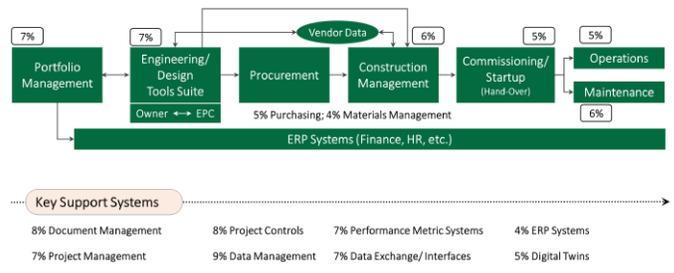


Figure 2

As for many of the capital projects IPA has evaluated, clear business objectives are crucial to successful project outcomes. That is a challenge for owners in the digitalization space, McNeil said. Just 25 percent of owner companies surveyed had clearly defined digitalization objectives linked directly to business goals. IPA is working with multiple clients to clarify their digitalization strategies, objectives, business value cases, and goals.

Another challenge is the vast array of digitalization projects that owners are pursuing, ranging from building benchmarking databases, to implementing “digital twins,” to integrating engineering with construction management tools. A July 2020 IPA survey reported 185 digitalization efforts that are spread evenly across owners’ project lifecycle and support systems—document management support systems;

project management, controls, and data management tools; and performance metrics software—are among them. **Figure 2** on the previous page shows the distribution of the activities within the project lifecycle. “There’s not a clear digitalization focus area in our industry,” McNeil said, referring to technology disbursements across capital project systems. The end-to-end distribution of digital optimization efforts speaks to the need for interoperability standardization across a wide array of project activities.

During the webinar, Alan Johnston, president of MIMOSA, an industry trade association dedicated to the development and adoption of vendor neutral information technology and information management standards, described how modularity, standardization, and interoperability have underpinned all three previous industrial revolution phases.

Industry 1.0 brought about standard gauge railroads and screw threads in the late 1700s, Industry 2.0 ushered in electrical and utility standards in the mid-1800s, and Industry 3.0 brought mechanical standards to the fore by the late 1960s. “It’s all about gaining efficiencies,” Johnston said.

Industry 4.0 is already underway, and the systems capable of open standards-based interoperability are currently shaping industrial digital ecosystems, including the open industrial interoperability ecosystem (OIIE) for capital

projects. The standards for an OIIE for capital project systems are still being rolled out, according to Johnston. However, an OIIE oil and gas interoperability pilot has been making headway, with several associated OIIE use cases developed to document the development, deployment, and success of information systems.

Dr. Matt Selway, a research fellow with the University of South Australia and a working group leader, outlined the OIIE standardized information system use case methodology for the webinar participants. A typical use case development process entails identification of challenges or opportunities and capturing preliminary business and technical requirements. The use case scope and success criteria are then defined, and the main success scenario for the use case is recorded.

Following Selway’s comments on the creation of use cases for the capital projects OIIE, McNeil asked participants to list digital optimization opportunities for phases of capital project development, including construction, startup, operations, and maintenance. The lists of opportunities were collected and will be the topic of discussion at the working group’s next virtual meeting on December 17, 2020.

Contact Deb McNeil at dmcneil@ipaglobal.com to learn more about the OIIE Capital Project Working Group.





New UIBC Research, Forum Presentations Reach Larger Audiences in 2020

By Geoff Emeigh, IPA Staff Writer

Upstream sector owner companies that benchmark their capital projects with IPA shared new industry research and Best Practices during the virtual 2020 annual meeting of the Upstream Industry Benchmarking Consortium (UIBC).

The UIBC 2020 event highlights included an update on the progress of a carbon reduction competitiveness working group (see cover story), an overview of how the capital projects industry is reacting to the pandemic, a keynote address by IPA President Edward Merrow, and competitive benchmarking results for global large-scale and site-based capital projects.

A summary of the new industry research delivered for the first time during the UIBC 2020 webinar series follows.

Clarity of Objectives: IPA research has long established an empirical link between the clarity of business and project objectives and project success. In an update to a UIBC 2019 study, IPA examines the addition of decarbonization and sustainability objectives to many E&P projects, and why it is even more paramount to understand why projects fail to deliver on objectives.

Water Injection Performance: One in every four E&P projects includes water injection; yet, IPA's previous research shows that water injection is not well understood. This study examines Industry's water injection performance and identifies Best Practices to improve performance.

Assessment of Engineering Quality: UIBC member companies often express concerns about the eroding quality of engineering. This study explores industry trends, issues, and possible strategies to improve engineering quality.

Site and Sustaining Capital (SSC) KPIs: Both cost and schedule performance outcomes for E&P SSC projects continue to trail Industry. In examining the relationship between key performance metrics and an organization's

stated goals and KPIs, IPA has found that there is frequently clear misalignment. The study addresses the question: Is Industry tracking the right KPIs to achieve stated goals?

The virtual 2020 forum, comprising a series of webinars running from late October to mid-December due to COVID-19 pandemic safeguards, enabled an expanded number of participants from each UIBC member company attending new research presentations and work sessions. Annual UIBC conferences are normally hosted by IPA at a resort in Northern Virginia, where high demand for participation necessitates a cap on the number of participants companies can send as delegates. Because the 2020 conference was presented as a series of live webinars, member companies could invite many more employees to attend IPA's research presentations and industry briefings.

Featured conference presentations were delivered twice in real time to accommodate different time zones. Also, unlike past events, webinar recordings were available to UIBC participants for a short time after the presentation.

To learn more about how your company can become a member of the UIBC, **contact IPA Director of Consortia Membership and the IPA Institute Andrew Griffith at agriffith@ipaglobal.com.**

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Middle East Capital Projects Struggle With Execution Schedule Performance

What Is Standing in the Way of Schedule Improvement?

By Rolando Gächter
IPA Director, Middle East Development

Capital projects in the Middle East have struggled to set realistic, or achievable, execution schedule targets for years. Independent Project Analysis (IPA) has continually proven, through its research on projects globally and in the Middle East, that project systems with strong schedule estimating capabilities can set predictable schedules and avoid the execution schedule slip that erodes a project’s capital effectiveness and undermines

Schedule Slip a Consistent Challenge Globally Significantly Higher in the Middle East Since 2012

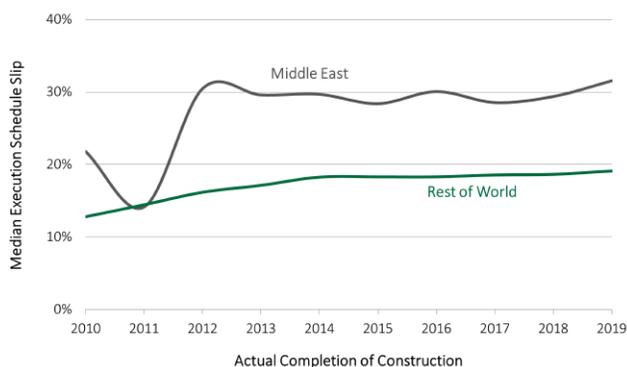


Figure 1

portfolio planning. However, the uncomfortable truth is that the region’s oil and gas, refining, and chemicals projects have not succeeded at incorporating real project performance metrics and execution schedule estimating Best Practices into their project development and delivery systems and continue to experience schedule slip at levels well above the global average.

According to IPA Project Analyst Daoud Kiomjian, projects located in the Middle East have experienced a median execution slip of more than 30 percent since 2010. Projects across the rest of the world within the same size range have experienced markedly less execution schedule slip over the past 10 years.¹ Remarkably, median execution schedule slip in the Middle East has remained amazingly constant since it first degraded in 2012. This consistency in median schedule slip is observed despite great variance in market conditions for capital projects over the same period of time. All of this leads us to ask the question: How many years of disappointing schedule predictability have to pass before estimating practices are changed **(Figure 1)**?

Different Market Circumstances, Similar Execution Duration Estimating Difficulties

A few years ago, IPA reported on the problematic schedule predictability surrounding large Middle East capital projects. Familiar trends were observed. From 2005 to 2015, median execution schedule slip for Middle East projects increased from 6 percent to over 25 percent. At the time, we discussed the primary cause: hot markets.

¹ Slips metrics provided for projects ranging from US\$10 million to US\$500 million in terms of size, or CAPEX.

Except for the disruption caused by the 2008 global financial crisis, the Middle East was often consumed by hot market conditions responsible for heavy demand for resources and strained supply chains. These hot market conditions caused owners to shorten construction schedules to get in front of increasingly escalating service costs and to capitalize on high commodity prices. These shorter construction schedules turned out to be aspirational and increasing slip in execution schedules was experienced.

Opportunities to improve the capital effectiveness of projects are increasingly important today given lower oil prices, increased attention to sustainability initiatives, and the overall uncertainty of current markets. The onset of the COVID-19 pandemic in 2020 has only complicated matters, and perhaps has heightened the urgency to improve project performance.

In the report we released in 2015, IPA Project Analyst Mark Etchells observed that owner companies should structure organizations and build teams with the ability to set “competitive and realistically achievable” schedules. “Target setting mechanisms need to be re-connected with the current project environment. They needed to be useful again in promoting incremental improvements in project performance over the long term,” Etchells said. In other words, companies that establish a structured target setting process and leverage real historical and current market data can strengthen their project estimation capabilities.

For owner companies in the Middle East, though, particularly nationally owned companies (NOCs), feeding actual project results data and lessons learned back into their own target setting practices has proven difficult. As Etchells commented recently for this article, acceptance of feedback into the planning process is vital. Past learnings, backed up with historical data, make for more productive discussions between business and project managers, regardless of personnel turnover. “The project team can say, ‘We’ve never done this type of project in just 8 months.’ Fine,” Etchells said. “Business has its objectives, but cost engineering pushback on schedules gets everyone thinking about how realistic a project’s schedule expectations are.”

However, project organizations in the Middle East are struggling to implement corrective actions that can drive system-level change. So why do owner organizations and teams delivering projects in the Middle East have such a hard time with schedule estimating?

How might owner companies break through barriers that appear to stymie efforts to make more realistic execution duration targets? Are schedule target setting lessons not being implemented or are they not being implemented effectively?

Here are a few ways project organizations and teams can establish effective feedback loops to set more realistic execution schedule targets.

Create a Schedule Database: Key to learning from the past is having structured data capture and storage mechanisms in place to enable project planning advances. Too often, IPA has found that project teams encounter a difficulties collecting the owner’s own project scheduling metrics, either because they were not captured or because the data are not easily accessible. Using quality data throughout the schedule estimating process results in accurate and competitive estimates and provides a baseline for project controls.

Strengthen Project Closeout Feedback Procedures: As mentioned above, IPA observes that Middle East-based project organizations often fail to capture lessons during closeouts. More troublesome is the lack of an effective channel to sow the seeds of change, particularly with respect to execution schedule estimating. The causes of schedule slip need to be identified and documented during project closeout assessments and then relayed back to the proper stakeholders.

A few reoccurring barriers or missteps undermine the effectiveness of closeout feedback procedures. At times, the wrong project functions or staff with less clout within the organization learn of unexpected events and misjudgments that, if better understood, could improve schedule estimating. Another barrier is the failure to conduct a true root cause analysis of schedule setting weaknesses. Rather than uncovering the underlying causes of scheduling faults, judgments are passed and blame is assigned to the first scheduling performance fault identified.

Reach Alignment Between Business and Project Functions to Lay the Foundation for a Realistic Schedule Target:

Lessons and historical data can be powerful resources when they are brought to the table at Business Engineering and Alignment Meetings (BEAMs), also known to some companies as Classes of Facility Quality workshops. Unfortunately, BEAMs are not part of many Middle East capital project delivery systems.

Getting business and engineering group representatives to meet to discuss a project’s constraints and boundary

conditions can drive more accurate schedule estimates, and ultimately improved schedule performance. IPA research found that projects that conduct a BEAM on average experience 10 percent less schedule slip compared to when a BEAM is not used for project development purposes. A project sponsor's engineering group needs a forum to push back on expectations if a project cannot be developed, executed, operated, and maintained within the execution duration conditions articulated by business. Therefore, business representation during a BEAM workshop is crucial.

How IPA Can Help Improve Schedule Estimates

IPA is conducting its own research to understand the persistent barriers to more realistic schedule estimates in the Middle East. Using real historical data from IPA's capital projects database, IPA has begun an in-depth analysis of the practices that inhibit project teams from generating more accurate estimates.

To learn more about the research, please contact Rolando Gächter at rgachter@ipaglobal.com.

Giving Back in 2020



The COVID-19 pandemic did not prevent IPA staff from performing community services in 2020. With safeguards to curb virus spread forcing business closures and job losses, charitable organizations were in greater need than ever of donations to provide hunger relief, mental health counseling, and family support services.

Of course, social distancing restrictions also caused the cancellation of the on-site events IPA staff regularly organize and participate in to collect money, like pancake breakfast fundraisers, chili cook-off competitions, and game nights. In lieu of in-person gatherings, IPAers found some creative ways to hold virtual fundraisers and volunteer time to assist local groups while protecting themselves and others from COVID-19. Some of those socially distanced events included online game nights, virtual pumpkin carving contests, and fitness-app monitored step competitions (steps for charity).

Globally, IPA raised and donated tens of thousands of dollars to help individuals and families suffering hardships. Here's a partial list of the organizations and campaigns IPA's Community Services initiative supported in 2020.

IPA North America (Ashburn, Virginia)—Loudoun Hunger Relief; Helping Hungry Kids of Northern Virginia; Marine Toys for Tots.

IPA Latin America (Curitiba, Brazil)—Fundação de Ação Social de Curitiba for the social protection of families and individuals in situations of risk and social vulnerability; NACEP for social projects and volunteer support for Curitiba; ONG Amigos of Caximba.

IPA EMEA (Reading, UK)—Naomi's House, protecting women victims of sexual exploitation; Beirut explosion disaster relief; support for local charities.

IPA Asia-Pacific (Singapore and Melbourne, Australia)—Bushfire relief; COVID-19 assistance; Lifeline, providing Australians with crisis support and suicide prevention services; WINGS, offering professional assistance in resolving psychological challenges for Singapore residents.

IPA is proud of its commitment to supporting communities. Many IPA employees volunteer their own personal time helping out at local food kitchens, shelters, and other venues in need of assistance.

Case Study:

Establishing and Improving the Stage-Gated Process

By Greg Ray, IPA Senior Project Analyst

Independent Project Analysis (IPA) has a well-established reputation of supporting multinational corporations and regional companies of all sizes in their commitment to continuously improve their capital project systems. Under IPA's guidance, owners in many industrial sectors, as well as the information technology and public domains, have been successful in creating and implementing project systems that deploy Best Practices to drive better outcomes for their capital investments. In striving for excellence, IPA's clients recognize that a standalone project risk analysis or system evaluation is just one part of a plan for meaningful and lasting change management and capital effectiveness gains.

So how does IPA go beyond single-engagement project evaluations to establishing continuous improvement systems for its clients? A recently completed client engagement helps illustrate IPA's partnership approach. IPA was asked by a mid-size infrastructure company with an annual capital spend of about \$300 million to help understand how it could deliver assets with better cost and schedule predictability. The client, who had never worked with IPA before, believed its estimating capabilities were at the root of its project predictability disappointments. IPA's initial benchmark evaluation made it possible to identify work process gaps—issues not with the people on projects, but within the stage-gated process. The case study that follows reviews what the first benchmarking evaluation found and how additional IPA-led analyses empowered the owner's business and project managers to begin the process of adopting industry recognized capital project system Best Practices.

Gap Analysis: Comparing the Delivery Process With Industry Best Practices

At the request of the client, IPA conducted an initial project system benchmarking, which involved a sample set of 10 projects that were indicative of the overall project system. The benchmarking results established a baseline of where the client's project system stood in regard to fundamental industry project management concepts such as stage gates, governance, and pre-authorization definition. None of the projects were considered excessive failures, nor were any massive success stories. All 10 were considered to be average and typical projects executed under the current project system.

The results of the benchmarking gave IPA a good understanding of a wide variety of project inputs and outcomes, particularly in regard to average cost and schedule predictability and cost and schedule effectiveness. This baseline also provided IPA with a detailed understanding of where the owner deviated from industry Best Practices in delivering those projects.

Project processes should facilitate an owner's efforts to maintain or boost its competitive advantage in the marketplace. In this client's case, speed was a project delivery imperative. Many of the owner's projects are initiated in response to its customers' demands. Therefore, IPA concentrated on project development durations including the timing and depth of gate reviews, review time required for full-funds authorization, and the potential for an early start of execution (i.e., starting detailed engineering before full-funds authorization). In addition, sequencing of construction completion, commissioning, startup, and handover to operations were all important in the context of requirements within the project process and the stage-gated system.

All of these system practices and processes were reviewed in-depth within the context of speed to delivery. In particular, certain practices could not be so prohibitive as to erode the owner's ability to maintain its leadership position in speed to its customers.



Gap Analysis: Comparing the Baseline With the Existing Process

A good work process is only effective if it is actually followed. The next step was to look at the baseline of projects and compare what actually happened on those projects with the owner's existing project implementation process. This kind of analysis offers crucial insights into existing system processes. IPA worked with the client to understand which deviations were the result of project-specific issues and which were systemic. In many instances, managers knew they were deviating from the system, although they regularly claimed they did so out of necessity. Indeed, IPA did not uncover many instances of project managers simply deciding to skip or bypass the system. Bringing forth the differences between "what we say we are doing" and "what we are actually doing" was the objective.

A good example of the identification of forced and unforced deviations involved the operational health and safety reviews of the engineering function. Best Practice is to complete a preliminary evaluation of the basic engineering deliverables (general arrangement drawings, plot plans, electrical single line drawings, pipeline and piping routing drawings, etc.) prior to submitting for project approval, or full-funds authorization. This is because, for most organizations, all recommendations that are generated from the safety review must be incorporated into the project scope, schedule, and cost. If the safety review is done after the project has passed the authorization gate, implementing those recommendations would necessitate a design change. For this client, due to perceived schedule constraints, many projects pushed their preliminary safety review off until the middle of the detailed engineering phase—a point after which changes become costly in both time and schedule.

Closing the Gaps on the Existing Process

IPA then worked together with the client to identify the areas in the current-state project implementation process documentation that either differed from the identified Best Practices or were not clearly written out, creating confusion. One interesting result of this detailed evaluation was that there were many industry Best Practices specified within the implementation documentation (i.e., the stage-gated process), but the timing or sequencing was incorrect. In many cases, the project managers for the organization knew what Best Practices should be implemented on projects, and in what sequence. They implemented practices in the order they understood rather than the company's documented project implementation process.

The gap analysis was a step-by-step evaluation of the internal owner documentation/project process and a comparison

directly to what IPA's data-based research has identified as industry Best Practices for project definition for all three phases of Front-End Loading (FEL 1, FEL 2, and FEL 3) and readiness for construction gates.

It is worth noting that without the original baselining of the project system, this part of the system evaluation would not have been as productive. The baseline showed that in many instances the project managers were going above and beyond what was specified within the documentation. Some managers had studied and incorporated modern project management theories and techniques on an ad-hoc basis, but others followed the flaws in the existing process. These gaps were very simple to add in to the owner's stage-gated process as practices required going forward.

Conclusion

Each organization is unique and has its own competitive advantage or perceived strength, and therefore the establishment of a new project system and subsequent improvements on the system requires an understanding of the specific organization. In this case study, the organization held itself as the "fastest in industry" to take projects from conception to completion—it was also significantly driven by customer demand and requirements versus internal research and development driven capital projects. Therefore, it was crucial for IPA to have a detailed understanding of a variety of the client's completed projects to fully understand the external drivers and stakeholders for the project system—to enable IPA to help the client in laying out a roadmap for improvement of the existing project system.

Estimating capabilities were at the root of its project predictability difficulties. Beginning with the end in mind, IPA's benchmarking of 10 of the client's projects at the start of the engagement gave IPA a definitive understanding of how the project system was working "in the field" and what was being followed, ignored, by-passed, or improved upon in reality. The detailed exposure to these projects and the teams also helped to build a trusting relationship between IPA and the client wherein the client became comfortable that IPA truly understood the particulars of its projects and its organization.

Today, the client has a 3-year project system improvement roadmap to follow. The start of the improvement plan involves minor and easily implementable modifications to the system, while the medium-term goal is a redefining of phases, gates, and deliverables to industry standards. The long-term goal is to be first quintile in predictability and effectiveness for safety, schedule, and cost, which IPA believes is a reasonable and achievable goal.



Are Site-Based Projects in Latin America More Difficult Than in Other Regions?—An Analysis

By Michele Adamoski Feres IPA Associate Project Analyst

Managers of site and sustaining capital (SSC) projects in Latin America contend with a variety of perceived region-specific obstacles to delivering capital effective site-based projects. Logistics and supply chain challenges, infrastructure inefficiencies, limited project team resources, poor labor quality, and taxes—and more taxes—are a few oft-cited reasons for disappointing SSC project outcomes throughout the region. Is it really more difficult to deliver cost and schedule competitive SSC projects in Latin America? Independent Project Analysis (IPA) recently looked at regional SSC project data and practices followed by site-based owner teams to find out.

Over the past 5 years alone, IPA has assessed more than 150 sustaining capital projects at 18 Latin American manufacturing sites. The projects represent a diverse cross-section of industries—refining; chemicals; mining, minerals, and metals; pipelines; and distribution. Located predominantly in Brazil, Chile, and Argentina, the project costs range from \$0.3 million to \$26 million.

IPA found that, on average, site-based project performance across Latin America lags the industry average of SSC projects in other global regions. To better understand the findings, let's take a closer look at IPA's recent examination of SSC projects in the region over the last 5 years.

Cost Predictability: We looked at how often actual costs deviate from their full-funds authorization estimate. The results are bi-modal: projects presented either small deviations or large ones—up to a 30 percent deviation in absolute numbers. Systems with large underruns seem to be using cost reduction exercises, cutting scope, or even changing strategies after authorization—or simply padding cost estimates. On the other hand, systems with large overruns did not account for the uncertainties resulting from their failure to adequately define the projects. Almost inevitably, late changes were necessary and there was not enough contingency to absorb them all. Although companies may prefer underruns to overruns, large deviations—positive or negative—are detrimental to system performance.

Cost Competitiveness: Projects in Latin America are indeed less competitive than worldwide projects. In the last 5 years, no site in Latin America had projects that were more cost-effective than the global average, according to IPA data. Some sites in Latin America even spent an average of 50 percent more than is typically required for the same scope. In a yearly portfolio of \$30 million, this means that these companies could be wasting \$15 million per year.

Schedule Predictability: When we look at execution schedule predictability, only one site completed projects slightly faster than planned. All the other sites slipped their

project execution schedules. On average, project execution slip was 22 percent, but some sites slip by 70 percent! However, here comes the surprise: on average, projects in Latin America are as unpredictable as global industry projects as the typical industry slip for site projects is 20 percent.

Schedule Competitiveness: It turns out that these unpredictable projects are also less competitive. On average, execution schedule outcomes were 35 percent slower when compared to similar projects.

Are Latin America's Projects Set Up for Success?

When evaluating site performance, one critical area of focus is project definition. During an IPA site-based (or any other) capital project evaluation, we assess the creation of project development work process deliverables. For example, IPA looks at whether a project team's cost engineers included sufficient detail in their cost estimate and schedule planning. We assess whether the project team collected sufficient information in the Front-End Loading (FEL) phase to reduce project execution risk. IPA's evaluations give project teams independently produced insights into whether their project is set up for success before business authorizes funding for construction. A non-existent or inadequate project work process, fragile gatekeeping, and thinly stretched project teams are often causes of poor definition. In Latin America, 64 percent of sustaining capital projects, on average, had *Poor* or worse project definition at authorization. The global industry average SSC project receives a *Fair* definition rating from IPA, but still well short of the desired *Best Practical* rating. Therefore, it can be said that projects in Latin America fail to define their projects as well as other global projects, thus driving the unpredictable outcomes.

Attention to Teams: Another critical area assessed by IPA in our evaluations of site projects is the project team itself. IPA's Team Development Index (TDI) measures the project team factors that drive project performance, taking into consideration the team's functional composition and clarity of roles and responsibilities. Across Industry, global site-based projects routinely fall in the *Fair* range, but projects located in Latin America are in the *Poor* range. Though some sites succeed in reaching strong team development, IPA finds that others struggle to define clear objectives. In addition, not all functions satisfactorily participate in the definition work process—operations, maintenance, and construction management input is often missing.

Weak Project Controls: Although Latin American project teams and definition trail the rest of Industry, our analysis

of another key area, project controls, provides a pleasant surprise. Globally, site-based projects have struggled to implement strong project controls, but the Latin America sample had stronger control practices in place than worldwide industry projects. The industry average for IPA's Project Control Index (PCI) falls in the *Poor* range, but 64 percent of the Latin America sample fell in the *Fair* or *Good* ranges. The driver of these better results is more frequent and detailed reporting during execution. Indeed, sites in Latin America adhere more to execution discipline.

Does a Commitment to Improvement Pay Off?

The first site had substantial improvement in both practices and performance—some projects demonstrated the site's capability to use good practices and deliver cost and schedule excellence. Through these improvements, this site, which has an average annual capital portfolio of \$50 million, saved \$6.5 million per year. The second site enhanced all project drivers, which allowed substantial improvement in the site's cost and schedule performance. These results allowed the site, which has an average annual portfolio of \$75 million, to save close to \$10 million per year.

Of course, there are some other important drivers of capital project outcomes that site project teams plan for but do not control directly.

Supply Chain Challenges: Emerging growth economies pose unique challenges for all supply chains, and Latin America is no exception—market and financial volatility, supply chain disruptions, security issues, infrastructural challenges, and lack of transparency are some of them. The effects of the COVID-19 pandemic on global and regional supply chains only complicates matters. Supply chain challenges are very common in Latin America and get even harder for projects developed in remote locations.

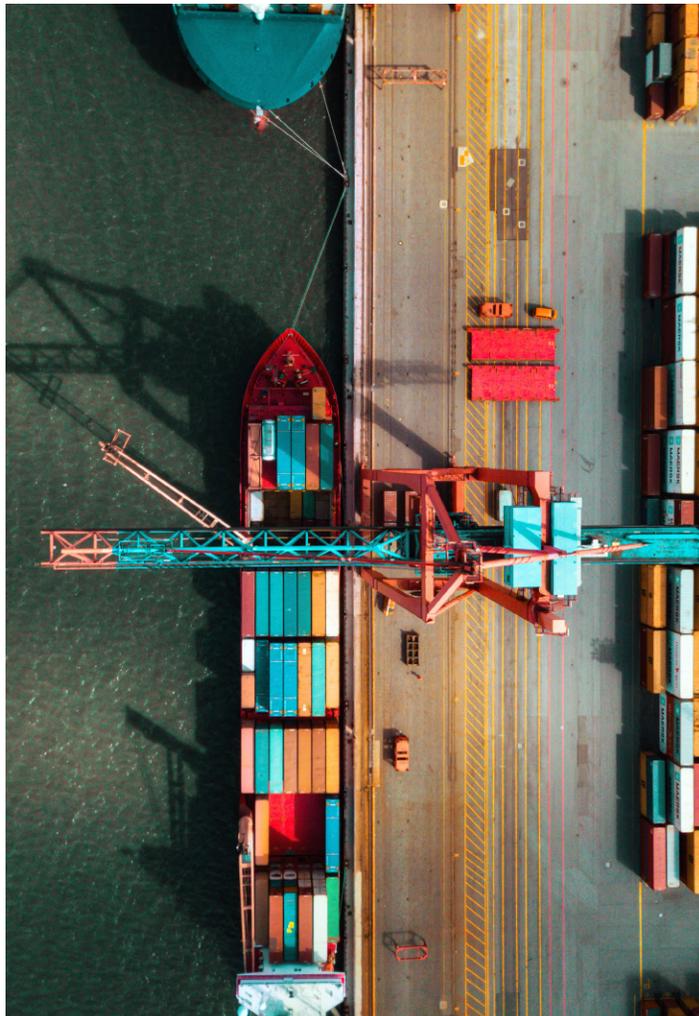
Infrastructure Inefficiencies: Local projects are greatly affected by the lack of high-quality services and assets, such as roads, rails, ports, airports, energy supply, and transmission lines, among others. Poor infrastructure services are among the main challenges Latin America countries currently face.

Although the SSC project managers perceive region-specific obstacles to delivering capital effective site-based projects, we can see that it is possible to extract value from smaller projects. Once the team is committed to embracing improvements in fundamental drivers—strong project definition and project teams in particular—better outcomes are achievable. It may be harder in Latin America than in other regions, but it is not impossible.

On-Demand Webinar: How the Capital Projects Industry Is Responding to COVID-19 (November 2020 Update)

Throughout the COVID-19 pandemic, IPA has been keeping the capital projects industry informed of how companies are working to secure supply chains, adapt construction work sites to keep workers safe, and re-balance project portfolios. In a live webinar recorded in December 2020, Jason Walker, IPA Deputy Director of Research, shared newly gathered information on how the industry is coping while the pandemic and its economic fallout continue to affect capital projects and project systems.

Visit www.ipaglobal.com/resources/webinars to watch the recording and download the slide pack.



More Webinars

Throughout 2020, IPA has been delivering free webinars to discuss issues affecting the capital projects industry.

To access the recordings and slide packs for the webinars below, visit:

www.ipaglobal.com/resources/webinars

IPA Snapshot Demonstration Webinar

With much of the capital projects industry working remotely due to the COVID-19 pandemic, the need for digital tools that can facilitate rapid decision-making has become more urgent. IPA recently developed *Snapshot: Subsea Tieback*, a cloud-based software solution that delivers real-time benchmarking and readiness information for fast-paced subsea tieback projects. In this webinar, IPA Energy Research Leader Jon Walker provides an up close look at how *Snapshot* makes life easier for subsea tieback project teams. (Recorded in September 2020)

Moving Forward With Digitalization in the Time of COVID-19 and Economic Crisis

In this webinar recorded on August 11, 2020, Deb McNeil, IPA Capital Solutions Director, reports on the results of a recent IPA survey on the impact of COVID-19 and the economic crisis on digitalization efforts. (Recorded in August 2020)

Making Smart Resource Decisions in the Midst of a Crisis

To deliver projects effectively when capital work resumes, it is imperative that owner companies make smart decisions now with regard to resource cuts. Sarah Sparks, IPA Product Development Leader, Organizations & Teams, hosted this live webinar sharing key project organization staffing data and information needed for smart decision-making. (Recorded in June 2020)

IPA Institute Announces Virtual Training Course Schedule for Early 2021

The IPA Institute has announced 11 new virtual training courses scheduled to take place between January and April 2021. Not to be confused with webinars, which mostly consist of one-way delivery, the new IPA Institute online trainings utilize the Webex Training virtual classroom platform. This requires the participants to think, consider, reflect, and respond to the content presented. The IPA Institute has designed these new online courses to be highly interactive, with some level of interaction every 2 to 5 minutes. The early 2021 schedule is outlined below. Additional courses will be added to the calendar throughout 2021. Click the 'Register' button to view additional details and to register online.

***Group Discount Available:** Register 3 and send a 4th for free!

Course	Dates	Times	Language	Fee	Click to Register
Establishing Effective Capital Cost & Schedule Processes*	January 25-29	9 a.m. to 11 a.m. (UTC-5)	English	\$1,000 USD	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	February 2 & 4	9 a.m. to 11 a.m. (UTC-5)	English	\$400 USD	REGISTER
Gatekeeping for Capital Project Governance	February 9-11	9 a.m. to 11 a.m. (UTC-5)	English	\$600 USD	REGISTER
Leading Complex Projects: How Do You Compare to Successful Leaders?	February 16 & 18	9 a.m. to 11 a.m. (UTC-5)	English	\$600 USD	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	February 23 & 25	10 a.m. to 12 p.m. (UTC-3)	Spanish	\$300 USD	REGISTER
Front-End Loading (FEL) and the Stage-Gated Process	March 2 & 4	10 a.m. to 12 p.m. (UTC-3)	Portuguese	\$300 USD	REGISTER
Capital Project Execution Excellence and Project Controls	March 9 & 11	10 a.m. to 12 p.m. (UTC-3)	Spanish	\$300 USD	REGISTER
Capital Project Execution Excellence and Project Controls	March 16 & 18	10 a.m. to 12 p.m. (UTC-3)	Portuguese	\$300 USD	REGISTER
Capital Project Execution Excellence and Project Controls	March 30 & April 1	9 a.m. to 11 a.m. (UTC-5)	English	\$400 USD	REGISTER
Project Management Best Practices*	April 5-9	9 a.m. to 12 p.m. (UTC-5)	English	\$1,200 USD	REGISTER
Gatekeeping for Capital Project Governance	April 13-15	9 a.m. to 11 a.m. (UTC-5)	English	\$600 USD	REGISTER

IPA Events and Presentations

Breakbulk Middle East

February 9, 2021
Virtual Conference

Rolando Gächter, IPA Director of Middle East Development, will be a panelist for a discussion on the breakbulk industry's response to and lessons learned from the COVID-19 pandemic. The panel will also review "how the industry can be better prepared should similar events happen in the future and what recovery management processes they have in place." More event information is available at: <https://middleeast.breakbulk.com/Business-Programme/>.

Industry Benchmarking Consortium (IBC)

Begins March 22, 2021
Virtual Meetings

Established in 1992, the IBC is a premiere group of the world's leading industrial companies in the processing, refining, infrastructure, and mining and minerals sectors. Through benchmarkings of both large and site-based systems conducted by IPA, IBC member companies receive exclusive insights into how their capital project systems and outcomes stack up against their industry peers with respect to safety, cost, schedule, and operational performance. IBC member companies actively discuss the latest capital project industry trends and performance hurdles at the annual meeting, as well as through competency-focused subcommittees, communities of practice, and periodic webinars. Contact Andrew Griffith at agriffith@ipaglobal.com for more information.

Upstream Cost Engineering Committee (UCEC)

June 2021
Details to Be Announced

The UCEC strives to improve upstream project and business results by providing metrics for better cost engineering. Member company representatives gather once a year to learn about and review new UCEC metrics packages prepared by IPA. The upstream metrics packages are used by companies to compare their upstream project cost and schedule outcomes with industry cost and schedule norms and, in general, boost business project estimate assurance and evaluation quality. Contact Andrew Griffith at agriffith@ipaglobal.com for more information.

Cost Engineering Committee (CEC)

September 2021
Details to Be Announced

The 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 cost engineer's capabilities. The primary vehicles for accomplishing these objectives are validation metrics, Best Practices research, and practice sharing. Contact Andrew Griffith at agriffith@ipaglobal.com for more information.

Upstream Industry Benchmarking Consortium (UIBC)

November 2021
Details to Be Announced

The 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 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. Contact Andrew Griffith at agriffith@ipaglobal.com for more information.
