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***Executing capital
projects in the
MENA energy
industry***

**Much to learn, more
to deliver**

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Executive summary



In the last two decades, the energy industry in the countries of the Middle East and North Africa (MENA) has seen significant capital investments across the value chain, from upstream oil and gas to downstream refining, to petrochemicals, and to power/renewables. The coming decade will see a wave of major capital projects in the energy sector among MENA countries — more than US\$1.1 trillion in projected spending, or one-fourth of the industry's total global investment through 2020. This is a significant capital outlay that needs to be carefully managed. History suggests that the region's companies have a mixed track record when it comes to executing large capital projects. Cost overruns, schedule slippages, and inconsistent quality have become recurring concerns for senior management. In our experience, the root causes of inefficient development, management, and execution of capital projects include a lack of clear governance, inadequate checks and balances, insufficient standardization, and a shortage of capabilities.

Before the bulk of these projects begin, MENA energy companies have a rare opportunity to fundamentally review the way they develop, manage, and execute their capital projects, to ensure that future spending is managed well. Specifically, the industry will need seven key habits in order to build world-class project delivery capabilities: (1) develop a clear engineering and project management (E&PM) strategy; (2) develop and implement a governance model with clear responsibilities and accountabilities; (3) establish best-practice processes including appropriate checks and balances; (4) develop in-house centers of excellence in key E&PM areas; (5) develop strategic alliances to address local capability gaps; (6) establish dedicated project and commercial academies to improve learning and development; and (7) increase standardization levels across all areas.

Failure to take corrective action now will mean a quick return to the disorganized days of the past decade, a significant loss of time and capital, and a missed opportunity to develop the local skills and capabilities required for the industry's future.

Key highlights

- Between 2011 and 2020, Middle East and North Africa (MENA) energy companies will invest more than US\$1 trillion on infrastructure, in oil and gas, refining, petrochemicals, and power/renewables, representing a fourth of all capital expenditures in the energy sector worldwide.
 - Historically, the region has a mixed track record in managing such large-scale projects, leading to cost overruns, delays, and other problems.
 - In order to manage megaprojects more effectively, MENA energy companies must master seven key habits of successful project delivery, which include developing a clear engineering and project management (E&PM) strategy, establishing a staged-gate governance model, fostering accountability with clear checks and balances, and improving local E&PM skills and capabilities.
-

A trillion- dollar challenge

Until the early 1990s, MENA countries were known primarily as the largest oil exporters in the world. Since then, these countries have made impressive strides in consolidating that position in oil markets and crafting a leadership position in new adjacent industries, such as bulk petrochemicals, natural gas, liquefied natural gas (LNG), steel, and aluminum. The industry has achieved this diversification by executing a number of groundbreaking new megaprojects across the Middle East. Examples include the following:

- **Saudi Arabia's** national oil company (NOC), Saudi Aramco, built infrastructure facilities in 2009 to increase its oil production capacity to 12.5 million barrels per day (bpd), including the development of the massive 1.2 million bpd Khurais field, at a cost of \$10 billion. Saudi Arabia has also become one of the largest players in the bulk petrochemicals market, with its flagship company, SABIC, among the top five producers worldwide. This has been achieved by establishing massive industrial sites at Jubail and Yanbu, which feature world-scale bulk petrochemicals complexes.
- **Qatar** has become the largest LNG exporter in the world during the past decade, by setting up 14 LNG mega trains through its two flagship companies: Qatargas and RasGas. In addition, Qatar also built the largest gas-to-liquids project in the world (in collaboration with Shell).
- **The United Arab Emirates** has been an early pioneer in developing LNG from the Middle East and is building highly complex sour-gas fields, along with a planned increase in oil production capacity.
- **Algeria** was the largest LNG exporter in the world before 2000, when Indonesia and subsequently Qatar took over the leadership position. In addition to building its flagship LNG projects, Algeria also became one of the largest piped-gas exporters to Europe (after Russia, Norway, and the Netherlands), by building major pipeline projects to Italy and Spain.
- **Bahrain** has established itself as one of the largest single-site producers of aluminum in the world. Its state-owned company Alba currently produces about 500,000 tons of aluminum annually.

During the coming decade, through 2020, the MENA energy industry is expected to continue this massive investment program by executing projects worth approximately \$1.1 trillion across the energy value chain. According to the International Energy Agency, the MENA region is expected to represent about 25 percent of global energy investments. Predictably, large resource holders such as Saudi Arabia, the UAE, Iraq, and Iran are expected to lead the way in spending (*see Exhibit 1, page 7*).

However, history suggests that MENA-region companies have a mixed track record when it comes to executing capital projects. Many of the region's flagship projects have encountered problems, such as cost overruns, schedule slippages, and inconsistent quality. These have become recurring concerns for senior management, especially over the past decade.

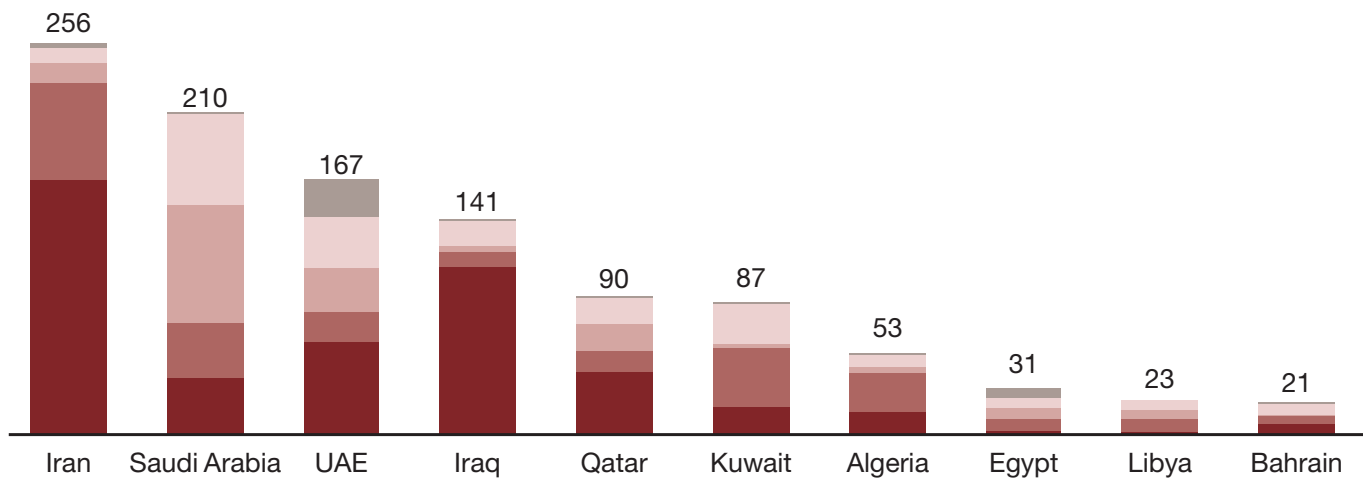
The root causes of these problems are related both to the overall market and to structural issues within MENA energy companies. On the market side, many factors have contributed to cost, schedule, and quality issues, such as the surge in commodity prices in the middle of the last decade, the overheated engineering and construction market, and an unprecedented number of projects being executed simultaneously in the MENA energy sector (many of unrivaled size and scale). In addition, limited availability of materials, equipment, and labor — including contractors — exacerbated these problems.

Though most of these factors are outside the control of regional energy companies, there are also unique structural issues that contribute to less than satisfactory performance in delivering capital projects. Understanding these structural issues is critical to achieving greater efficiency from the trillion dollar investment program in the energy sector over the next decade.

Exhibit 1

Resource-rich countries in the MENA region are projected to invest heavily in capital projects through 2020

Forecast of MENA Energy Investments by Country, 2011–2020 Projects Budget Value (in US\$ Billions)



Sector	Investment (in US\$)
Upstream	\$460 billion
Downstream	\$227 billion
Power	\$190 billion
Petrochemicals	\$162 billion
Renewable energy	\$38 billion
Total	\$1,077 billion

- Renewable energy
- Power
- Petrochemicals
- Oil & gas (Downstream)
- Oil & gas (Upstream)

Note: Upstream oil and gas includes oil and gas production, gas processing, and LNG production; downstream oil and gas includes refining and pipeline; petrochemicals here includes chemicals and fertilizers; and renewables here includes alternate energies such as hydropower, solar, nuclear, hydrogen, wind, etc. A majority of Iran’s investments are speculative in nature. They are highly dependent on political stability in Iran, its international relations, and its commitment to move ahead with the investments.

Source: MEED Projects database; International Energy Agency; Strategy& analysis

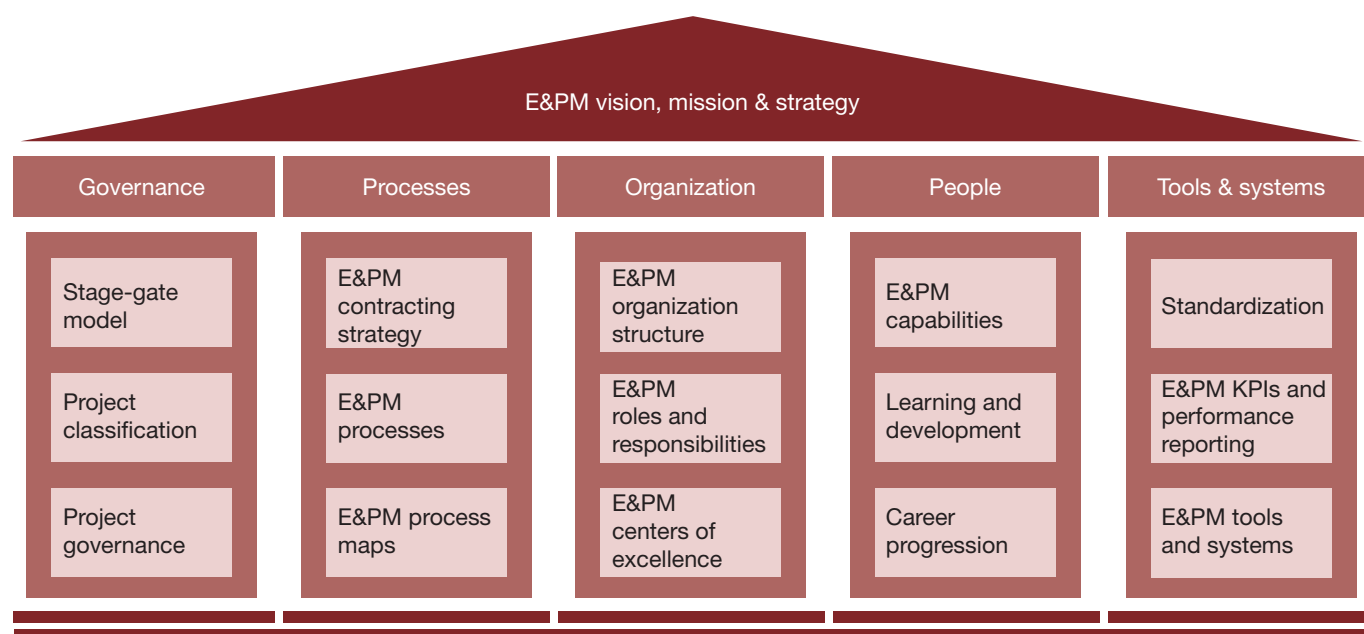
The root causes of poor project delivery

Our long experience in setting up and restructuring project organizations for international oil companies (IOCs) and NOCs shows that companies typically need to think about five key pillars in executing large-scale capital projects (*see Exhibit 2*). These five pillars are governance, processes, organization, people, and tools and systems.

Exhibit 2

The strategic framework for engineering and project management (E&PM)

E&PM Strategic Framework



Note: KPIs = key performance indicators

Source: Strategy&

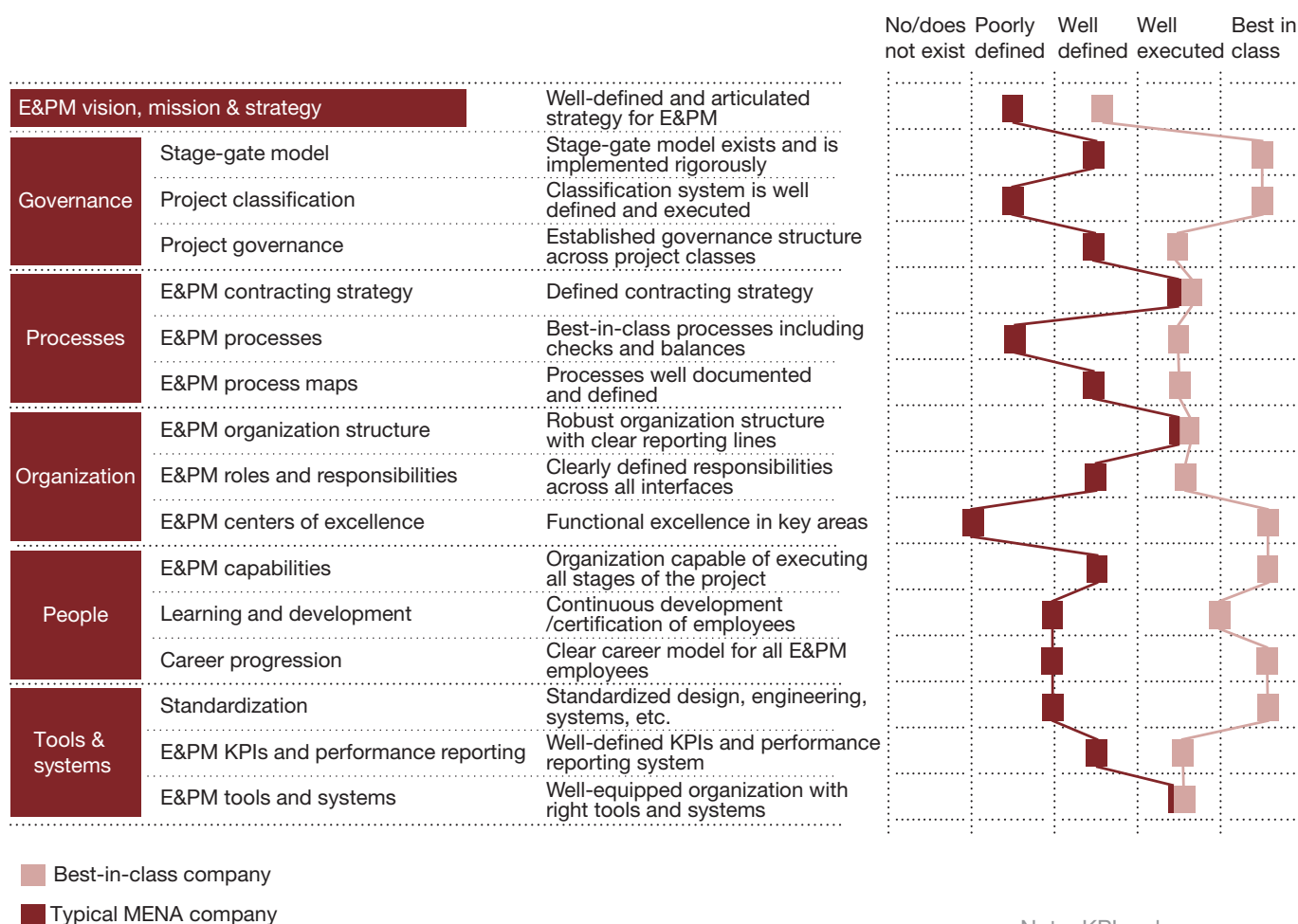
Benchmarking the E&PM strategy of MENA companies with international best practices along the framework described above shows that MENA companies face structural issues in all five areas (*see Exhibit 3*).

1. Governance: Failure to follow the governance model for project delivery

MENA companies typically have a stage-gate model on paper, but there is very little discipline in adhering to this governance model. Nor do these companies typically complete all of the required deliverables at each gate to make a concrete go/no-go decision about advancing a project. As a result, the scope of projects often changes at later stages — sometimes significantly — leading to additional work, cost escalation, and project delays.

Exhibit 3

MENA companies fall short in all five areas compared to best-in-class IOCs



Note: KPIs = key performance indicators

Source: Strategy&

2. Processes: *Inadequate value engineering, project assurance, risk management, and other best-practice processes, along with insufficient checks and balances in the system*

MENA companies have historically relied on outside players — such as IOCs and international engineering, procurement, and construction (EPC) companies — to deliver complex megaprojects. As a result, they have been slow to adopt best-practice processes such as value engineering, risk management, and project assurance. MENA companies have also not fully embraced the concept of front-loading, pre-FEED (front-end engineering design) analysis, or formal feasibility studies. These processes can help align the design stage with the overall project scope, and ensure sufficient oversight during execution.

3. Organization: *Unclear roles and responsibilities*

The roles and responsibilities of the various entities involved in MENA projects — central engineering, project management, production, research and technology, and business units — are blurred, with no clear ownership across the various stage gates. Companies also often fail to delineate the interface among these entities as the project progresses through the stage gates.

4. People: *Lack of qualified resources and absence of capabilities*

The significant capital spend in the MENA energy sector over the last few decades has not resulted in a thriving, local base of talent in engineering and project management. As a result, the next wave of short-term investments in the MENA region will still need a significant injection of Western and Eastern expatriates — along with additional costs and time lags in procuring labor from outside the region. Worse, this deprives the region of a unique opportunity to create long-term employment opportunities and local E&PM capabilities.

5. Tools and systems: *Failure to implement standardization across projects*

MENA companies have typically relied on foreign joint venture partners such as IOCs or contractors in project management consulting (PMC) or EPC to provide project standards. As such, companies find that they operate with a large number of diverse standards for the projects executed in the MENA region: engineering-related, design-related, equipment-related, and project-related. For smaller MENA companies this is typically not a problem as the recurring capital spent is relatively minimal. However, for the larger companies that are managing and executing projects worth tens of billions of dollars every year the lack of standardization is costing significant time and money.

A lack of standardization across projects is costing significant time and money.

Seven habits of successful project delivery

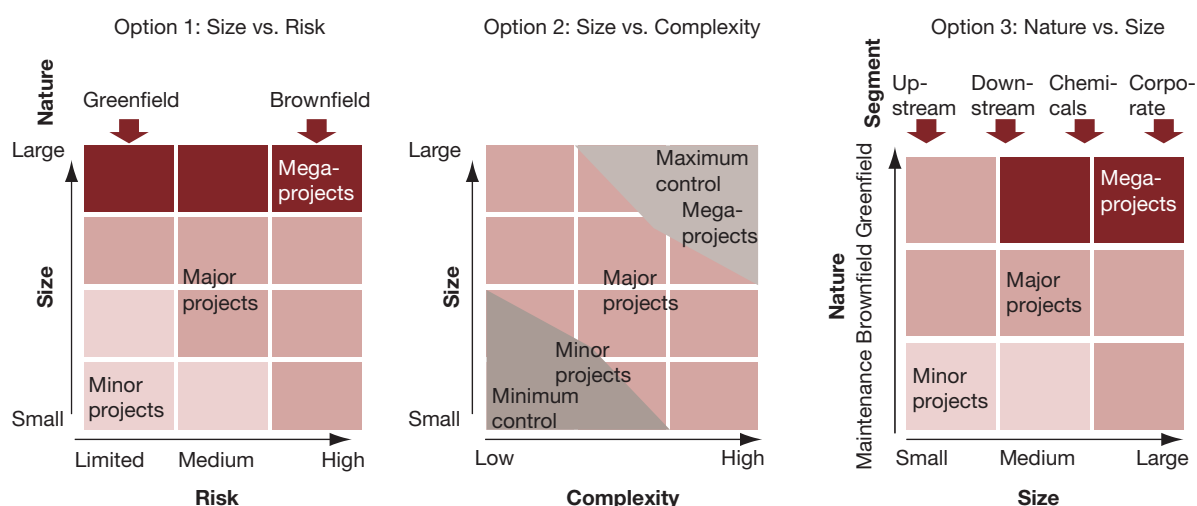
Our diagnosis of the root causes of poor project delivery in MENA companies suggests that there are seven key habits these companies need to master if they want to build world-class capital project delivery capabilities.

1. Develop a clear E&PM strategy

MENA companies should develop a clear E&PM strategy to ensure that they are well-equipped to manage and execute their capital projects. This strategy will define which projects and activities will be performed by the company itself and which will be outsourced.

To develop this strategy, companies should create a rigorous and transparent project classification framework. Projects are typically classified by risk, size, complexity, and nature (see Exhibit 4).

Exhibit 4
Typical project classification frameworks



Note: Shading refers to the scope of the project.

Source: Strategy&

The process of project classification will help derive a tailored execution strategy for each project. Overall, three main types of strategies are available for a company:

- Manage and execute the project in-house
- Manage the project in-house and outsource project execution
- Outsource both project management and project execution

The first and foremost driver behind the choice of the E&PM strategy is to have sufficient project control to ensure maximum value creation for the company. As such, regardless of the project class, companies should aim to manage and execute early phases of their projects in-house. Through this front-end loading companies will ensure that they spend sufficient time and resources in the project's early stages — identify and assess, and select — to properly assess the opportunity; identify key value drivers, risks, and uncertainties; and align objectives with all major stakeholders.

This focus on the first two phases of the project maximizes value creation and realization and improves the project's outcomes (*see Exhibit 5, page 13*). In cases where a company lacks the sufficient in-house capabilities needed to perform the activities in these first two phases, it should opt to use PMCs. Though this may be a reasonable short- to medium-term solution, it is our opinion that building in-house project management capabilities should be a key strategic objective for any company.

In the last three phases of a project — define, execute, and operate — MENA companies should also aim to be, at a minimum, heavily involved in project management activities regardless of the project class. In fact, performing these activities in-house can be critical to ensuring that the project scope remains within the company's requirements, along with controlling costs and scheduling for the project.

When it comes to project execution activities, MENA companies will have to assess different drivers for defining their project delivery strategy, specifically the following:

- The national agenda
- The availability of in-house capabilities
- The availability of capabilities in the country

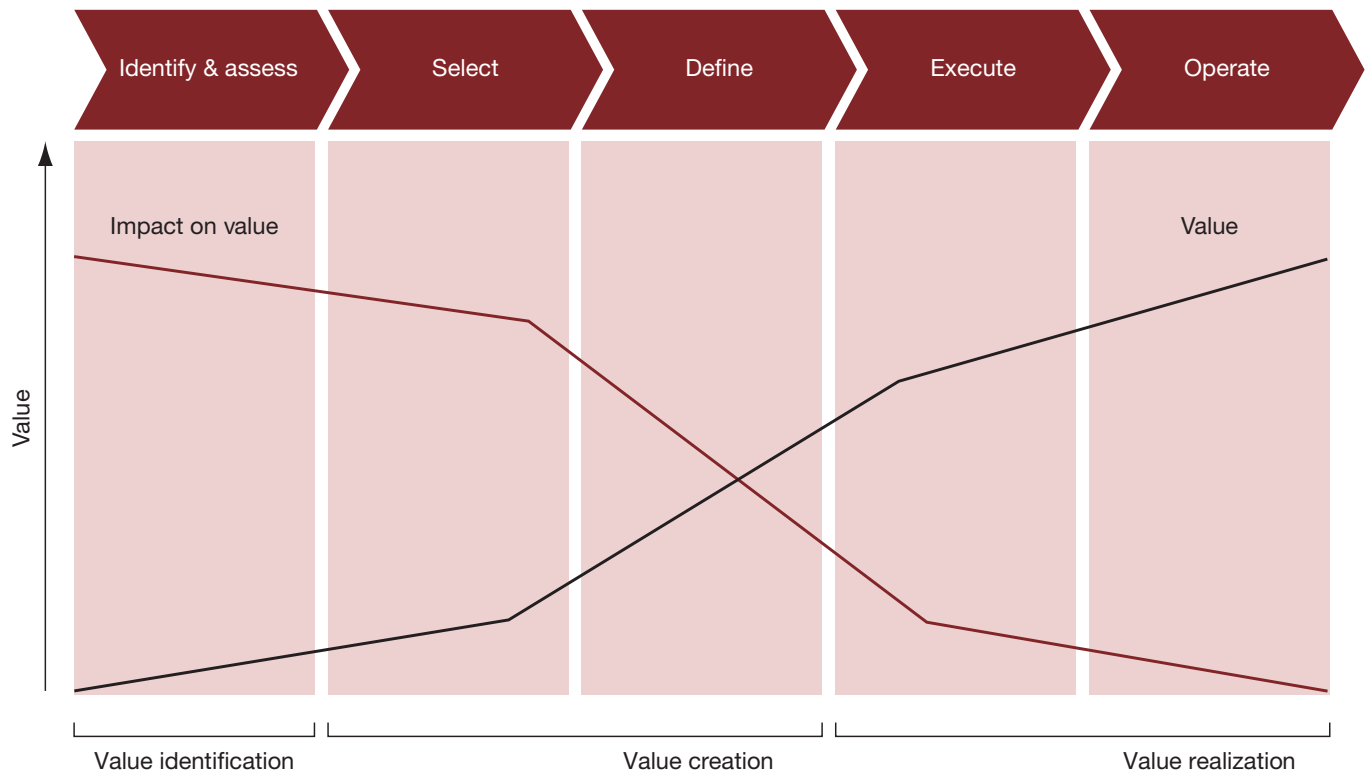
2. Develop and implement a governance model with clear accountabilities and responsibilities

Best-practice companies generally have different governance models for the various classes of projects (e.g., megaprojects and minor projects). A well-developed governance model will clearly define accountabilities and

Exhibit 5

The impact of front-end loading on project value

Project Value Across Five Phases of E&PM



Source: Strategy&

establish the roles of the various entities in the project setup (see *Exhibit 6, page 14*). For example, megaprojects — those of higher cost and complexity — are usually closely monitored by the company's leadership, while smaller and less complex projects can be controlled at the business unit or asset level.

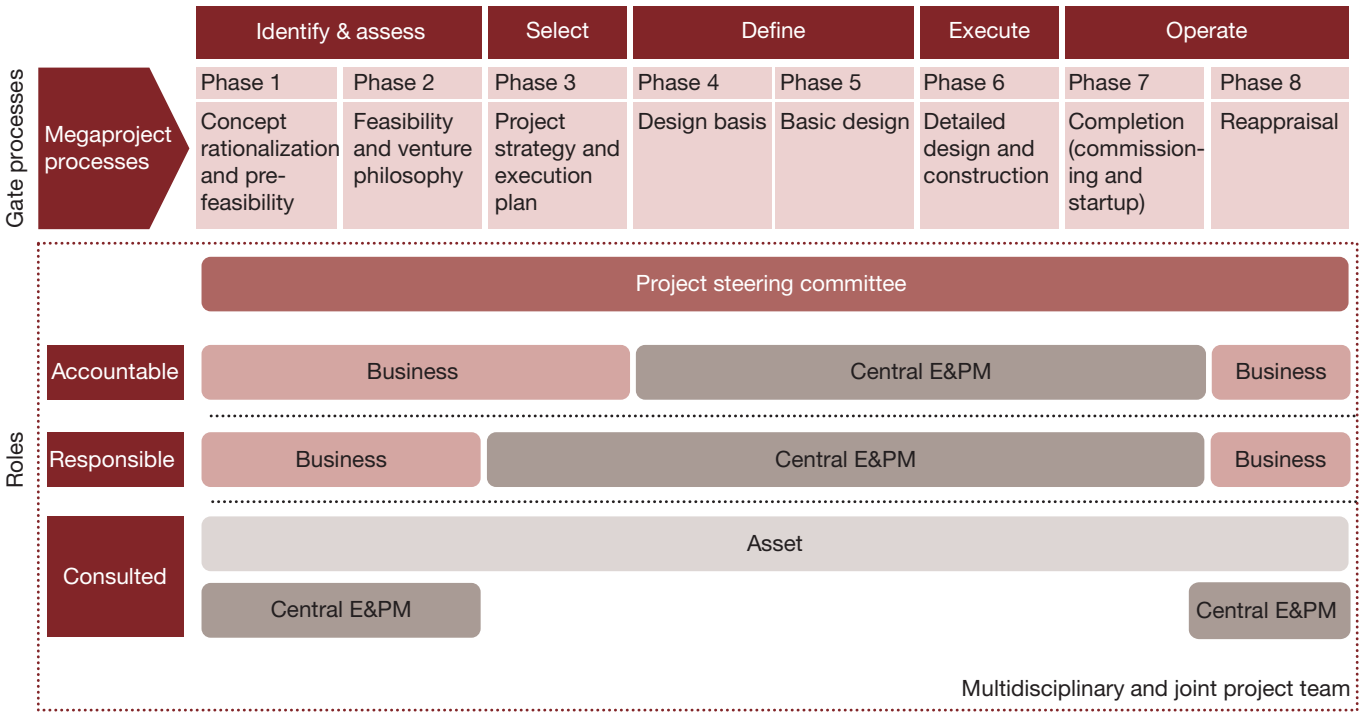
Generally, direct management responsibility for the project varies depending on where it is in its life cycle. The business owner will be more heavily involved during the initial two phases (Identify and Assess, and Select), while E&PM will manage the next two phases (Define and Execute). Finally, once construction is complete, the project will revert back to the control of the business owner for operation.

To ensure seamless accountability and responsibility during these transitions, projects typically employ a single project steering committee that remains the

Exhibit 6

A well-developed governance structure clearly defines roles and accountability

Megaproject Gating Processes: Accountabilities and Responsibilities



Source: Strategy&

same throughout the entire process. This committee will make strategic decisions regarding marketing agreements, financing, technology, and other issues that might significantly affect the business case.

3. Establish best-practice processes including appropriate checks and balances

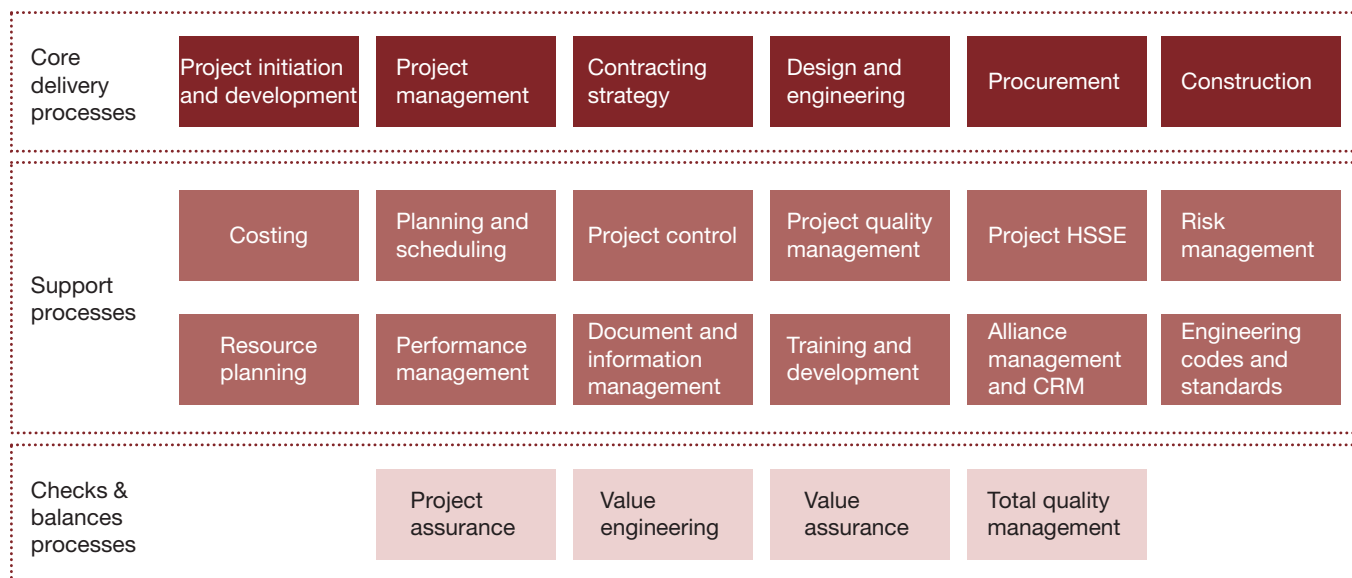
MENA companies should also establish best-in-class processes to master project development and execution. These processes can be split into three areas: core delivery, support, and checks and balances (see Exhibit 7, page 15).

To assess the readiness of a project to move to the next phase in the stage-gate process, top-performing companies have developed and

Exhibit 7

MENA companies should establish best-in-class E&PM

E&PM Level 1 Processes



Source: Strategy&

implemented appropriate checks and balances to ensure that safety, quality, and performance standards are met and that the project's business case is still valid at each gate. These processes will also ensure that a company captures any potential synergies from concurrent projects and that it incorporates lessons learned and applicable designs from past projects.

Additionally, some of these NOCs have adopted peer reviews at different gates to augment the project governance structure and to act as an independent auditor for the project team. Best-practice companies can generally differentiate the required checks and balances and deliverables based on the project class to establish the right equilibrium between flexibility and control. Finally — and critically — the gates must be closely linked to the company's key performance indicators (KPIs).

4. Develop in-house centers of excellence in key E&PM areas

Successful companies also need to establish an engineering and technology center of excellence (COE) to improve their performance. COEs can typically cover as many as five main mandates:

- Achieve functional excellence by standardizing processes and capturing and disseminating best practices
- Provide expert and technical services to project teams as required
- Identify, analyze, and disseminate new technologies
- Manage talent development for technical staff
- Manage relationships with technical/technological suppliers and, in some cases, coordinate research activities with academic and international institutions

The type and number of mandates covered by the COE depends on the size and diversity of the company's operations and the geographies it covers. Additionally, COEs are organized according to different models depending on their degree of evolution. Nascent organizations typically establish a small and centralized COE that exchanges information with project teams. More evolved COEs at more advanced companies provide dedicated resources to project teams on a temporary basis, in order to share knowledge and bring lessons learned back to the COE (*see Exhibit 8, page 17*).

5. Develop strategic alliances to address local capability gaps

Regional energy companies often seek to outsource functions to outsiders such as engineering partners, which might have relevant knowledge in key areas where the company lacks sufficient expertise. The structure of this relationship is crucial. Traditional outsourcing is a one-shot contract targeting specific technical expertise for a project. It is usually based on an international tender process and is not fit for long-term developments. Furthermore, it is clearly based on temporary contractual relations rather than on a willingness to develop business.

Instead, companies should consider embedding this relationship in a joint venture or strategic alliance. Structured correctly, such an alliance can bring mutual benefits to both partners, and speed up the development of the NOC's own capabilities.

Although some engineering companies can be reluctant to share their know-how, recent success stories show that with the right incentives, major international engineering firms have willingly agreed to set up mutually beneficial strategic alliances with NOCs, IOCs, and regional companies.

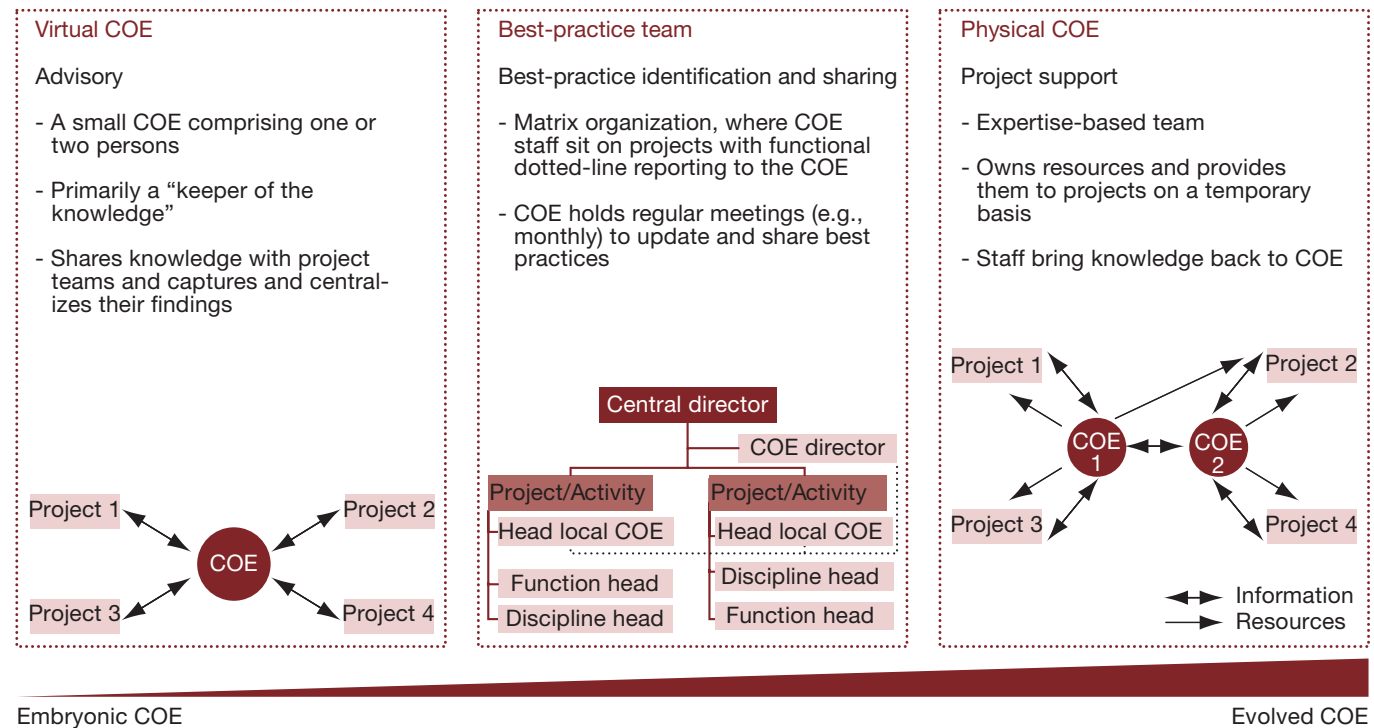
A good initial step is to develop a pilot project, which offers a training ground to assess how well the two companies work together and whether they are willing to share common benefits. The terms of the contract become relevant in this approach. For example, setting up a cost-plus contract with additional performance incentives is usually more flexible and more adaptable than a simple lump sum. However, this practice may interfere with local regulations, which apply to some national companies (such as through a national code for procurement within public services).

Structured correctly, strategic alliances can bring mutual benefits to both partners and speed up development of the NOC's own capabilities.

Exhibit 8

Engineering and technology COE models improve a company's performance

Different Center of Excellence (COE) Models



Source: Strategy&

6. Establish dedicated project and commercial academies to improve learning and development

Like other regions in the world, MENA countries suffer from a scarcity of engineering resources. Over the past several decades, younger generations have drifted away from careers in oil and gas, in part because they find the job to be strenuous and unrewarding. Instead, new graduates are seeking out other sectors, such as banking, communications and media, real estate, and IT, which are seen to offer more attractive career paths and better salaries. To remedy this shortage in human resources, some energy companies are now creating dedicated project and commercial academies, which aim to bridge the gap between the industry and the students, as well as to enhance existing capabilities in the company.

In fact, companies could easily develop an internal academy through a venture with specialized engineering schools. Companies such as Statoil and Petrobras have created their own universities to develop internal resources and help strengthen their positions as top world performers in project development. They have developed curricula and joined with local and international universities in an effort to shape the young graduating workforce to their needs and expansion strategies.

The academy programs are necessarily tailor-made, as they must answer practical problems for the company's managers and professionals. Case studies — with the participation of local employees — are often key to the success of the programs. Furthermore, these centers could also provide a necessary research catalyst around specific scientific topics in line with the company's objectives.

7. Increase standardization levels across all areas

The traditional reliance of MENA energy players on international engineering companies has led to a number of problems related to standardization, among others. The outside contractors mainly develop projects according to their own standards and national practices.

As a result, regional companies have more difficulty in integrating present operations, generating measurable feedback, and assessing performance. They find themselves developing multiple technical solutions for the same problem across locations, and procurement issues arise because equipment originates from different sources. In addition, they remain dependent on the original designs for projects that outsiders have generated for them.

In light of these challenges, we believe that a key factor for successful project delivery is to establish internal engineering standards and increase standardization levels. These standards are an important asset for the company and will bring many benefits:

- Increased business efficiency and overall cost reduction by simplifying design, controlling design options, and favoring interchangeability of equipment
- Enhanced technical integrity
- Increased health, safety, and environmental performance
- Improved technical knowledge through technology transfer and best-practice sharing within the company as well as with other international companies

Commercial academies can help address the scarcity of engineering and project management talent in the region.

Conclusion

As a new wave of mega investments begins, now is the right time for MENA energy companies to fundamentally review the way they develop, manage, and execute their capital projects. They should master seven key habits to build world-class project delivery capabilities. In addition, through these major capital project programs, MENA companies have a unique opportunity to build and incubate the local private sector, to play an essential national role in contributing to GDP and overall economic development. Perhaps most importantly, they can help build homegrown capabilities and reduce dependence on outsiders.

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