

NPMOs Delivering Infrastructure of the Future

Imad B. Ghantous PE,
May 30, 2021



Abstract:

Developing nations around the world are realizing the importance of National Project Management Organizations to the development of their vision for economic diversification, better return on investment, job creation, efficiency, auditability and standardized processes and procedures. Analysis of NPMOs around the world indicate a wide range of involvement ranging from an advisory role to a more proactive role. Based on their mandate and authority their effectiveness in the enablement of project delivery varies. The organizational structure, role and responsibility and accrued benefits are analyzed. Recommendations based on lessons learnt are included to drive and inform a better configuration and mandate for NPMOs.

NPMOs Enabling Economic Growth

Modern, efficient Infrastructure underpins the economic health of all nations, supporting the economy, improving productivity, and providing access to opportunities to build stronger communities. Strategic and integrated planning of Infrastructure investments, pursuing best practice procurement and delivery that sees new infrastructure constructed for the right reasons at the right price, is key to its success.



Nations around the world have realized the need for a National Project Management Office (NPMO) to ensure that the development of the nation's infrastructure is in line with the National Integrated Infrastructure Plan, has been prioritized and vetted adequately to ensure the highest returns for the government's investment, and to be the promoter of "Best Practices" in planning and execution of the works.

Dependent on the level of competency of the Governments' entities' PMOs (EPMO), the scope of the national central clearing house (NPMO) will vary from a strategic advisory capacity to a fully-fledged support entity to ministries with the ability to take on the management of nationally important projects directly.

Infrastructure Contribution to Growth

Infrastructure, both social and economic, is the backbone of a diversified economy. Infrastructure affects aggregate output in two ways: directly (contribution to GDP) and indirectly (more efficient use of conventional productive input)

The benefits of smart infrastructure investment are:

- Long term competitiveness
- Productivity
- Innovation
- Lower prices
- Higher incomes
- Job creation
- Safer communities



Every Dollar invested in Infrastructure boosts economic activity by \$1.8- \$2.0

Emerging markets must provide the proper mix of economic, social, and environmental factors (enabling environment) to deal with the surge of infrastructure spending needed to grow the economy

Insufficient or underdeveloped infrastructure presents one of the biggest obstacles for economic growth and social development worldwide. Infrastructure projects are high on governments' agendas, and the infrastructure-development and investment pipeline, is huge.



The current global project pipeline is estimated at \$9 trillion, one-third of it in Asia. India is expected to spend some \$500 billion on large-scale projects a year to accommodate population rise in 2030, half of which will be in the energy and utility sectors. According to the World Economic Forum, Worldwide investment in infrastructure is expected to be \$79 trillion by 2040. However, the actual global investment need is closer to \$97 trillion. To close this \$18 trillion gap, average annual global infrastructure investment would need to increase by around 23% per year. Most of this infrastructure gap is attributed to insufficient investment in road and power sectors.

Infrastructure Projects' Issues

However, major infrastructure projects have a history of problems. Cost overruns, delays, failed procurement, or unavailability of private financing are common. The final cost of the much-anticipated Eurotunnel between the United Kingdom and France, for example, was significantly higher than originally planned, while the Betuwe cargo railway linking the Netherlands and Germany came in at twice the original \$2.76 billion budget and more than four times the original estimate. These problems are neither confined to a country nor to the past. The construction of Kuala Lumpur's new airport terminal KLIA2 opened in 2014 faced huge cost overruns and significant delays following frequent design changes. The new Berlin Brandenburg Airport and Jeddah International Airport are also prime examples of grossly delayed and over budget projects.



Characteristics of large infrastructure projects are:

- Infrastructure projects involve large CAPEX and OPEX, which makes financing an issue
- Commercial benefits occur over a long period of time making them unattractive to investors
- Infrastructure projects are high risk undertakings
- Many infrastructure projects are late, over budget, and with quality below expectations
- Lack of accountability
- Can be politically motivated
- Cross-sector Infrastructure projects experience further delays due to lack of coordination
- Lack of robustness in business case due to ministries' zeal to push through projects for approval or lack of understanding of potential project benefits

Increasing Infrastructure Productivity

Increasing infrastructure's productivity begins in the planning phase. A more pragmatic approach to selecting infrastructure projects in which to invest – including a systematic evaluation of costs and benefits, should be based on precise criteria that account for broader economic and social objectives.

Some countries are already reaping the benefits of such an approach. South Korea's Public and Private Infrastructure Investment Management Centre has reduced infrastructure spending by 35%; today, officials reject 46% of the proposed projects they review, compared to 3% previously.



Similarly, the United Kingdom established a cost-review program that identified 40 major projects for prioritization, reformed overall planning processes, and then created a cabinet sub-committee to ensure faster delivery of projects, thereby cutting infrastructure spending by 15%.



Additional opportunities for savings lie in more streamlined delivery of infrastructure projects. There is massive scope to accelerate approvals and land acquisition, structure contracts to encourage innovation and savings and improve collaboration with contractors.

In Australia, the state of New South Wales has cut approval times by 11% in just one year. And one Scandinavian road authority reduced overall spending by 15% by updating design standards, adopting lean construction techniques, and taking advantage of bundled and international sourcing.

Governments must also recognize that the private sector can provide more than infrastructure financing; it can also offer know-how in the planning, construction, and operation phases. Chile, the Philippines, South Africa, South Korea, and Taiwan are all developing frameworks that expand the role of private players in planning projects.

Research revealed that most governmental infrastructure projects experience considerable delays and budget overruns and need a NPMO-type organization to improve all steps in the project lifecycle across departments in the government. The effectiveness of enabling government entities' project management offices, and applying project management processes, tools, and techniques, will benefit the delivery of infrastructure projects.

NPMO Assessments and Evaluation

Fourteen NPMOs of twelve countries were examined through a desktop study to understand their scope, mandate, responsibilities, and structure. Additionally, six of those were selected to perform a deep dive to draw parallels with NPMOs applicable in the Middle East. The PMOs examined were:

| | | | |
|----------------------|---|--|--|
| EUROPE | United Kingdom Scotland | Infrastructure & Projects Authority (IPA) Infrastructure Investment Board (IIB) | |
| NORTH AMERICA | United States of America United States of America Canada | General Services Administration (GSA) Atlanta Regional Commission (ARC) Infrastructure Canada (IC) | |
| AUSTRALIA | New Zealand Australia | National Infrastructure Unit (NIU) Infrastructure Australia (IA) | |
| ASIA | South Korea Malaysia Singapore | Public & Private Infrastructure Investment Management Center (PIMAC) Economic Planning Unit (EPU) Ministry of Finance- Center for Public Project Management (C2PM) | |
| AFRICA | Gabon Rwanda | Agence Nationale des Grand Travaux d'Infrastructure (ANGTI) Single Project Implementation Units (SPIU) & Project Management & Monitoring Unit (PMMU) | |
| MIDDLE EAST | Saudi Arabia Qatar | National Project Management Organization (Mashroat) Central Planning Office (CPO) | |

The analysis indicates commonalities between the various PMOs namely:

- The authority given to PMOs vary from a strong enforceable mandate to a more advisory collaborative role.

- The PMOs have the responsibility of developing the National Integrated Infrastructure Master Plan and continually update it and be its guardian and enforcer.
- PMOs develop a prioritization mechanism based on analytical assessment of bankability as well as “Strategic Fit” of candidate projects.
- PMOs develop a Stage Gate evaluation system to ensure that projects that move forward are viable and have complied with Best Practices throughout the lifespan of the project
- Certain PMOs have also assisted in establishing strategies for PPP models for project procurement and financing
- PMOs have provided support to EPMOs in terms of technical advice and training of personnel
- Certain PMOs may intervene directly as project manager on special projects. For example, the Gabon PMO was involved in all steps of project lifecycle, including site supervision, but this is the exception.



Summary overview of countries and NPMO main areas of intervention

| | Planning | Engineering Review | Construction Management | Operations |
|---------------------|----------|--------------------|-------------------------|------------|
| IPA (UK) | ✓✓ | ✓✓ | ✓✓ | |
| IIB (Scotland) | ✓ | | | |
| GSA (USA) | ✓ | ✓ | ✓ | |
| ARC (USA) | ✓ | ✓ | | |
| IC (Canada) | ✓✓ | ✓✓ | ✓✓ | |
| PIMAC (South Korea) | ✓✓ | ✓ | ✓ | |
| IA (Australia) | ✓ | | | |
| NIU (New Zealand) | ✓ | | | |
| EPU (Malaysia) | ✓✓ | ✓✓ | ✓✓ | |
| C2PM (Singapore) | ✓✓ | ✓✓ | ✓✓ | |
| ANGTI (Gabon) | ✓✓ | ✓✓ | ✓✓ | ✓✓ |
| SPIU's (Rwanda) | ✓✓ | ✓✓ | ✓✓ | |
| CPO (Qatar) | ✓✓ | ✓ | | |

(✓: support, ✓✓: support and execution)

(*) Intervenes directly as project manager in the execution of projects

Deep Dive- Seven NPMOs based on relevance to the GCC

Seven NPMOs were then selected out of the former fourteen and analyzed in greater detail, as they had NPMO type organizations most relevant to the GCC and are involved in planning and/or execution of large infrastructure projects and improvement of efficiency and effectiveness of project delivery, namely:

- United Kingdom: Infrastructure & Projects Authority (IPA)
- Gabon: Agence Nationale des Grand Travaux d’Infrastructure (ANGTI)
- South Korea: Public & Private Infrastructure Investment Management Center (PIMAC)
- Australia: Infrastructure Australia (IA)
- Qatar: Central Planning Office (CPO)
- Malaysia: Economic Planning Unit (EPU)
- Saudi Arabia: Mashroat



For each of the above countries, the following themes were analyzed:

- Mandate

- Responsibilities
- Degree of direct involvement into planning and execution of projects
- Lessons learned
- Priorities for the future

The actual filtration process is summarized in the table below:

| Country | NPMO | | Remarks |
|----------------|--|-----|---|
| United Kingdom | Infrastructure and Projects Authority | +++ | Similar Capex levels and challenges as in GCC, as well as good information on lessons learned, based on public audits conducted after 5 years' operation on MPA, IUK and ultimately IPA. IPA has a mandate to act as project manager in the execution of projects. |
| Gabon | National Agency of Great Works | +++ | Similar challenges faced in GCC, such as achieving economic diversification and a more sustainable growth through effective infrastructure development and reforms. ANGTI is also an interesting case as it has the highest degree of involvement in project delivery. ANGTI has a mandate to act as project manager in the execution of projects. |
| United States | General Services Authority | + | GSA does not handle large infrastructure projects such as rail, roads/highways, airports etc. |
| United States | Atlanta Regional Commission | ++ | ARC's function is mainly collaborative between cities and counties and does not focus on enabling government entities in project management and delivery. |
| Canada | Infrastructure Canada | + | IC is a cross-sectorial ministry ensuring funding and delivery of projects in cities, communities, and regions, not a PMO-type organization that provides project management support to ministries. IC has a mandate to act as project manager in the execution of projects. |
| South Korea | Public and Private Infrastructure Investment Management Centre | +++ | PIMAC is an interesting case as it has proven success in improving the most important phase in the project lifecycle, i.e. the feasibility study, across ministries and sectors, and on PPP projects, which receive the highest scrutiny. As a result, PIMAC has established itself as the leading national agency in the evaluation and management of public and private investment in South Korea, as well as a well-renowned global partner in PPP management. |
| Australia | Infrastructure Australia | +++ | IA's support in project planning & prioritization in the Roads/Highways, Rail and Ports sectors, make Australia and IA a relevant case for the GCC NPMOs. |
| Singapore | Centre for Public Project Management | ++ | C2PM has a mandate to act as project manager in the execution of projects. |
| Rwanda | Single Project Implementation Units and Project Management and Monitoring Unit | + | The institutions are limited in scale, and the success has so far been relatively limited. Donor-driven initiative. SPIU's have a mandate to act as project manager in the execution of projects. |
| Qatar | Central Planning Office | +++ | CPO is particularly relevant as an example of an NPMO in the GCC in light of its ambitious development programs in s and the short time scales both countries have set out to achieve. |
| New Zealand | National Infrastructure Unit | + | NIU has limited resources and essentially supports infrastructure project development by drafting NIPs, issuing business case & procurement guidelines and sponsoring infrastructure projects. NIU's degree of intervention is thus relatively limited. |
| Scotland | Infrastructure Investment Board | + | Not considered relevant enough due to its relatively small size and limited Capex. |
| Malaysia | Economic Planning Unit | +++ | EPU is highly relevant considering size of the population and vision of the 10th Malaysia Plan. It is also interesting in view of its long history (1961) and learning experience, vast responsibilities, and involvement of EPU on all government projects. EPU has a mandate to act as project manager in the execution of projects. |
| KSA | National Project Management Organization (Mashroat) | +++ | Responsibilities include setting up the processes and procedures for delivering Projects, setting up the EPMOs in the various ministries, knowledge transfer. Most relevant to GCC given its relevance to Vision 2030 . |

The major attributes of the six analyzed NPMOs were compiled in the table below to create a platform of commonality to allow conclusions and recommendations to be made

| Context | KSA (NPMO) | UK (IPA) | Gabon (ANGTI) | South Korea (PIMAC) | Australia (IA) | Qatar (CPO) | Malaysia (EPU) |
|---------------------------------------|--|--|---|---|--|--|--|
| Size (Square Kilometers) | 2,149,690 | 242,495 | 267,667 | 100,363 | 7,692,024 | 11,581 | 330,803 |
| Topography | Mostly Flat | Varied | Varied | Varied | Mostly Flat | Flat | Varied |
| Population | 34,218,169 | 67,886,004 | 2,119,275 | 51,709,098 | 225,805,600 | 2,795,484 | 32,730,000 |
| GDP | | | | | | | |
| PPP (\$Billion) | 1,924.000 | 3,174.000 | 38.280 | 2,293.000 | 1,416.000 | 357.338 | 900.426 |
| Nominal (\$Billion) | 779.289 | 3,124.000 | 17.212 | 1,586.000 | 1,618.000 | 183,910 | 336.330 |
| GDP/ Capita | | | | | | | |
| PPP (S) | 56,817 | 47,089 | 38,280 | 44,292 | 54,891 | 138,910 | 27,287 |
| Nominal (S) | 23,566 | 46,344 | 8,384 | 30,644 | 62,723 | 66,202 | 10,192 |
| Oil/Gas as % of GDP | 42% | Negligible | 50% | 6% | Negligible | 60% | 20% |
| Economic Diversification | Dominated by Oil/Gas | Well Diversified | Dominated by Oil/Gas | Well Diversified | Diversified | Dominated by Oil/Gas | Diversified |
| Level of Infra Dev | Early | Advanced | Early | Advanced | Medium | Early | Advanced |
| Annual Infra. Budget | | | | | | | |
| Current (\$Billion) | 28.00* | 120.00** | 1.0 | 129.00**** | 48.796 | 22.00 | 5.8 |
| Planned (\$Billion) | *** | - | - | 136.74 | - | 27.00 | - |
| Master Plan | | | | | | | |
| Vision | Vision 2020 & 2030 Diversify the Economy away from Oil/Gas Dependency | A new economy that puts the next Generation first with solutions to long term problems | Vision 2025 Diversify economy away from Oil/Gas Dependency | A robust export-based economy with government commitment to invest in Infrastructure | Transition from a Mining Boom to a stronger more diversified new economy | Vision 2022 & 2030 FIFA World Cup and Diversify economy away from Oil/Gas Dependency | Vision 2020 the Economic Transformation Plan for a more diversified self-sufficient and inclusive economy |
| Cost (\$Billion) | 1000.00**** | 675.00 | 25.00 | - | 110.00 | 205.00 | 200.00 |
| Problems with Infrastructure Delivery | <ul style="list-style-type: none"> Absence of a national integrated Infrastructure Master Plan Lack of a consistent evaluation method for vetting projects based on Total project costs, Cost Benefit Ratio and "Strategic Fit" Lack of required skill set to manage large, complicated projects Attraction training and Retention of skill set within Ministries Cross sector collaboration Portfolio Management Assurance reviews, Audits, and feedback | <ul style="list-style-type: none"> Lack of proper rigorous vetting of projects and rash commitment to budget and schedule Lack of consistent data on projects Lack of transparency and reporting Proper prioritization mechanism of projects based on a stage gate approach Proper consistent metrics for performance management Lack of accountability Capacity and skill set building within the Ministries Portfolio Management | <ul style="list-style-type: none"> Lack of an integrated National Master Plan Lack of templates, data, and tools to assess prioritization of projects Lack of mature management talent within the ministries/ Agencies to manage the works Lack of talent development plans Lack of cross sector cooperation Lack of rigorous feasibility studies Political affiliations and special interests | <ul style="list-style-type: none"> Influence from interested groups No independent review processes Economic value isolated from social value Lack of standardized guidelines and databases Capital project budgeting inconsistent with Medium Term Expenditure Framework Traffic forecasting results biased towards over-estimation No before and after appraisal | <ul style="list-style-type: none"> Limited budget necessitates prioritization Inadequate financial feasibility studies Lack of standardized streamlined templates and tools to promoting entity Lack of understanding of "strategic fit" Lack of audits and evidence-based processes Cross sector collaboration Retaining alignment with the National Guidelines for Transport System Management | <ul style="list-style-type: none"> Absence of a national integrated Master Plan Ambitious schedule and targets Lack of skill set within EPMOs. Lack of cross sector collaboration Lack of Portfolio Management Lack of a proper prioritization Mechanism of projects. No stage gate process to ensure vetting and quality of project execution Lack of accountability affiliations and special interests Availability of data, reviews, Audits and feedback | <ul style="list-style-type: none"> An ambitious development plan leading to self-sufficiency in 2020 Portfolio Management of major projects of national importance. Cross sector cooperation Policies and strategies for Socio-Economic development Monitoring and evaluation of projects and consistent feedback Development of Human resources and retention Consistent Data and metrics for project evaluation |

*Includes allocations for Infrastructure, Transportation, social infrastructure elements such as education and Healthcare are not included

**Accounts for the Transportation Budget only

*** the long term planned budget is not yet declared

**** Includes \$500 billion NEOM budget and \$200 billion for Energy projects

***** Includes \$90 Billion in direct investment in large scale corporate projects, public sector projects and private investment in public projects

Summary of Findings

Following are the observations concluded from the analysis:

- While the countries investigated are at various levels of development with different size land mass and economic indicators, they all share similar visions of developing their respective nations to provide a better standard of living for their citizens and to be an active participant in the global economy.
- They have all understood that the main economic driver to achieve the ambitious plans of either achieving self-sufficiency, diversification or even to just maintain their leadership role in the global economy, is the development of the national infrastructure and invest wisely in projects that are economically bankable and have a "strategic Fit" within the overall national development strategy.
- The development of the National Infrastructure must follow a well-developed integrated Master Plan that is implemented through the prioritized list of projects that considers the governments' limited resources and works within the budgetary framework of the Governments' Fiscal plan.
- The establishment of an entity that is mandated with drafting the National Infrastructure Master Plan, Prioritizing the projects needed to achieve the objectives of the masterplan, vetting the projects to ensure their bankability and highest returns, mentoring, and supporting the EPMOs and cross sector coordination and lastly assisting the Governments in identifying and

implementing new and innovative financing of infrastructure projects, is critical to their respective vision of the future.

- The degree of success of those NPMOs has varied dependent on the delegated authority given by the government of their respective countries. Some NPMOs have acted more as a think tank assisting the government with Strategic decision making, in others the NPMO has been amazingly effective in vetting projects prior to funding to ensure a proper business case supports their initiation and in others the NPMO have actually been very heavily involved in all aspects of the project life cycle including acting as a project manager during project delivery.
- The key to the degree of involvement of the NPMOs is the degree of maturity of the EPMOs in the various ministries and their ability to deliver projects and meet the National vision.
- The ability of the NPMO to discharge its auditing responsibilities, is directly dependent on its ability to develop and enforce templates for project reporting through the stage gate process.
- The NPMO's participation in training the EPMOs is highly effective in achieving high competency within those EPMOs and a more streamlined and efficient delivery of projects



For the reasons mentioned above, it is highly recommended that GCC countries adopt this approach of establishing a single entity for planning and delivery of its National vision

NPMO Delivery Model

The architecture, structure, and attributes of the delivery model are a direct response to the roles and responsibilities that are expected from the NPMO.

In what follows, we will look at an idealized NPMO model that incorporates the roles and responsibilities of a more heavily involved NPMO like the ones we would identify in the GCC region. This could be modified by peeling back some of the roles and responsibilities and the associated NPMO departments that are responsible for delivering them

NPMO Roles and Responsibilities:

- Develop, manage, and update an integrated national infrastructure masterplan and provide the necessary support in prioritizing projects
- Develop and constantly update a suite of Processes and procedures for the management and delivery of projects effectively and efficiently. Promote innovation, quality, and safety
- Conduct an audit of the existing capabilities within the ministries and then provide the necessary training including the provision of job training, shadowing, certification, tools, and templates to enable the establishment of the EPMOs and its operation using best practices
- Ensure compliance with the published processes and procedures by the EPMOs and provide an oversight, advice, and assistance as needed
- Provide evaluation of the performance of the EPMOs versus predetermined KPIs
- Provide PMO services for Nationally important projects or ones that involve several ministries. Appointment by exception
- Participate in communications with stakeholders that have jurisdiction over the projects or have interest therein including the private sector
- Provide Finance, legal HR, IT and administrative support to the NPMO as needed

Mapping of Roles and Responsibilities to NPMO Departments

Based on the aforementioned required roles and responsibilities following are the departments, appropriately mapped to their respective roles and responsibilities within the overall framework on the NPMO:

Strategy Department: Provide overall NPMO strategy and corresponding road map

Commercial Department: Financial, Legal, and Commercial Services to the NPMO

Support Department: Provide the necessary support for the NPMO to discharge its duties and obligations

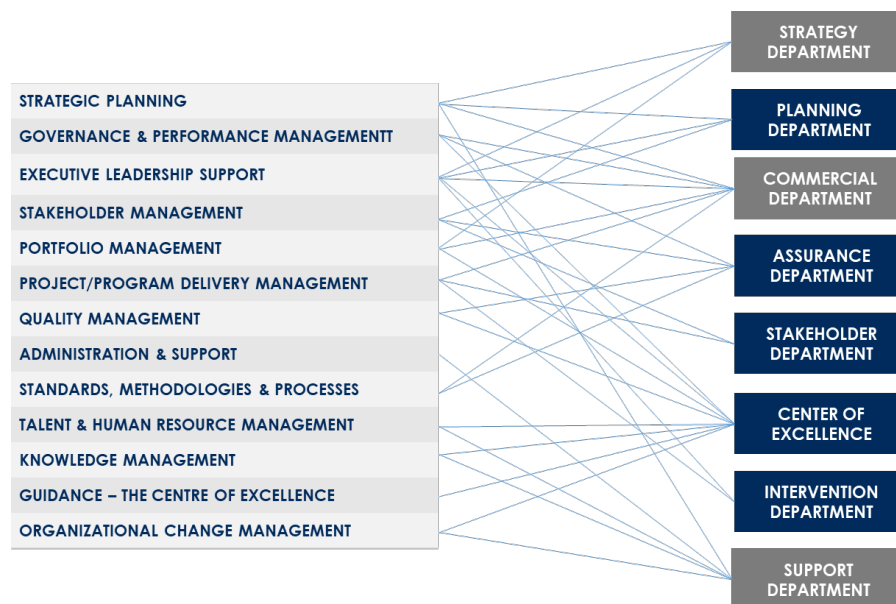
Planning Department: Provide the National Integrated master plan and support project prioritization

Quality Assurance department: Establish the National standards, Processes and Procedures, support and monitor the EPMOs in their implementation

Stakeholder Department: Coordinate with the Infrastructure stakeholders

Center of Excellence: Provide the EPMOs with training, support, certification, tools, and guidance

Special Projects Department: Provide PMO/PMC services for singular projects of National importance or crosses ministries' boundaries, when requested



The organizational Structure

The organizational structure basic architecture involves three areas of operation:

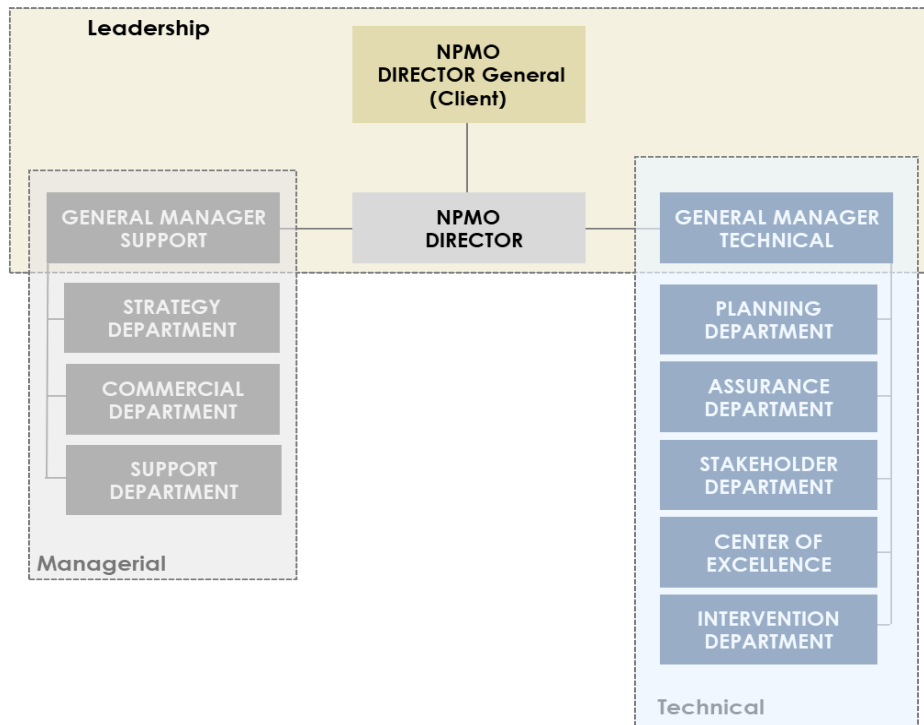
Leadership: This is the center for command and control of the NPMO and will normally have a representation at the executive level of the NPMO host ministry

Managerial: This set of departments will manage the NPMO and provide services for the NPMO to discharge its duties and responsibilities

Technical: This set of departments will provide the technical services required by the NPMO to enable the EPMOs as well as taking on PMO/PMC assignments by exception

The overall organizational structure is depicted below. Admittedly, a high-level depiction but nevertheless should give a macro view of a scalable organization that maps directly to the role requirements.

Obviously, based on the actual requirements dictated by the various parameters of the specific NPMO this template will need to be modified to reflect the same.



Advantages Accrued:

At the Government Level

- Strategic Alignment with Government Goals and Objectives
- Economic Diversification
- Improved Return on Investment
- Job creation
- Transparency and auditability
- Improved collaboration between ministries

At the Ministries Level

- Improved Return on investment
- Coordinated Integrated Master Planning
- Portfolio Governance and management
- Standardized processes and procedures
- Performance management and measurement
- Deliberate and organized change management
- Coordinated Stakeholder Management across ministries
- Evaluation, Training & Accreditation



At the National Master Plan Level

- Standardized project management methodologies, processes, and procedures
- Commonality of Standards
- Standardized Document Controls
- International Best-Practice
- Proactive Innovation

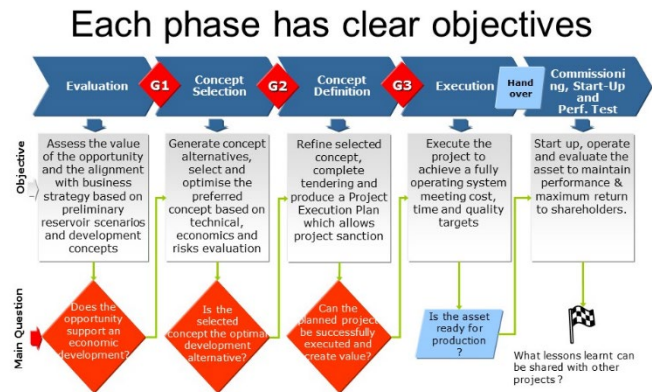
- Professional Development

Enhancements to NPMOs Based on Lessons Learnt

Based on the present analysis of international experience and lessons learned, the following potential enhancements and priority functions would be important to incorporate for NPMOs in the Middle East:

Stage Gate Review Procedure

The NPMO can be most effective in implementing its assurance work through the use of a Stage-Gate process. The effectiveness of this process has been demonstrated in many countries and is a core process in standard project management procedures. It allows for optimizing projects in terms of quality, schedule, sustainability, and cost, creates checks and balances, and makes people responsible and accountable. It also creates a log of key decisions and data on the project over time, such as revised cost estimate or return on the investment. In particular, the lack of robust planning during the conceptual design and business case phase of projects is a serious issue within major government projects and exacerbates problems during project implementation.



The Stage-Gate process should follow a simple mechanism and be practical so as not to slow down the progress of the projects. Although it might seem laborious in the beginning, civil servants quickly realize that it eliminates much rework, speeds up the overall delivery time, and allows for significant cost savings. The NPMO should be in a position to stop projects or withdraw funding if a project fails to pass a Stage Gate.

Training sessions in the Stage-Gate process for Ministry departments' staff, including ministers, should be planned.

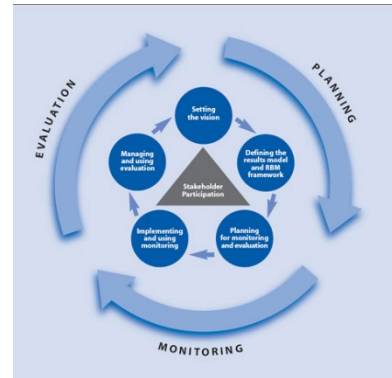
The NPMO should pay particular attention to ministry departments with challenging, high-risk portfolios of major projects, and match individuals with relevant experience to partner with the review team and should make efforts to build the pool of assurance reviewers.

Front-end planning and project prioritization

Achieving the highest quality during all stages of a project lifecycle will be a primary objective of the NPMO. Experience shows that the most important stage is the feasibility study and the business case. In fact, many countries have NPMO-type organizations with many resources that focus solely on this phase. PIMAC in South Korea, for example, has achieved unprecedented results with this model. In the UK and Gabon, it has also been identified as being a critical issue.



The success or failure of projects is most often determined at their earliest and most formative stage: *the planning phase*, which includes master planning, project prioritization, budget programming, feasibility studies and business cases. Projects that have crystal clear objectives, well-defined benefits, appropriately detailed plans, the right level of financial resource, the right people with the ability to understand and manage key stakeholders, and the right leaders, are the projects most likely to succeed. The more participation by the NPMO at the project inception to set the projects off on the right course, the fewer will sail into stormy waters and end up with a red delivery confidence assessment. Furthermore, it is critical that the project parameters such as the vision and concept remain intact throughout the lifecycle of the project.



Arriving at a consensus both internally and externally on the relative importance of projects and their prioritization of funding is difficult unless a standard methodology for evaluation is agreed upon. In essence, any project which is not in the Integrated National Infrastructure Master Plan - or has passed a Gate 0 - should not be included in the annual budget. A decree should be issued instructing compliance with the approved master plan and Stage-Gate process.

The project evaluation methodologies utilized by NPMO's are usually an analytical framework that address an Infrastructure priority list that is developed through a staged assessment process to prioritize between investment proposals. The primary driver for this methodology is the cost-benefit analysis (through the Benefit-Cost Ratio BCRs) for decision making. However, the process is not strictly analytical and a custom-tailored structured approach, that combines the economic appraisal of a project's BCR with its assessment of each project's "strategic fit" in order to identify the projects worth considering. All relevant monetized and non-monetized impacts need assessment in a comprehensive and wholistic approach. Assessment of the strategic fit is where the evaluation criteria depart from the analytical to the qualitative realm and with less transparent governance, actual decisions would reflect more of a political decision that would consider specific welfare programs and projects that have long term benefits that might not be evident today or perhaps reflect special interests. The NPMO should develop a tailored methodology that is agreed upon by all main stakeholders across the Government, accounting for both quantitative and qualitative criteria.



The NPMO should work with ministries' departments to improve their project planning, following a formal procedure and methodology, and ensure that they have devoted sufficient attention to the planning phase before seeking project approval.

The legal and institutional framework that guarantees independence and objectivity to the evaluation body is an important element. A Feasibility Study (FS) team should not be in any way influenced by other players interested in the project - whether the budget authority, the competent authority, or a private concessionaire. It is also important that the government lends its full support, and that all decision-making reflects evaluations made by the FS team.



For the FS team to maintain independence and objectivity, the roles and functions of each key player should be clearly defined in the legal and institutional framework, and they should be respected and acknowledged. In addition, the government needs to allow the FS team to expand its expertise and to build capacity.



Monitoring and evaluation contribute to the FS learning cycle. Evaluation processes at each stage of FS implementation, such as assessment of project proposal, and review of draft concession agreement, are all useful. Management of projects at the operational stage is also an important place for the monitoring process. Through the post evaluation and monitoring, the NPMO and government officials are more likely to be alert of any contingent fiscal risk or burden.

Degree of involvement in the execution of projects

Depending on the nature of projects and the capabilities of the EPMO's within the ministries, NPMO's may be given the mandate to act as project manager for the execution of projects. Best practice is for NPMO's to get involved in the following ways:



1. In all cases studied, the end-user ministry is responsible for project delivery, while the NPMO may take responsibility for cross-sector projects of strategic importance. No model was found of a separate execution agency for project delivery.
2. Assurance, enablement, and execution. However, in all NPMO's analyzed, the ownership of the project remains within the Ministries. In this case, the latter often employ external PMO's to manage the project.
3. NPMO involvement in execution occurs, by exception, in the following cases:
 - Project Management on "multiple-sector" projects when it cannot be determined which sector a project falls under, and thereby which ministry it belongs to, e.g., an urban regeneration project involving habitat, roads and rail, or a road/rail bridge.
 - Project Management on projects in Ministries or agencies that do not have an EPMO, e.g., the Ministry of Finance requiring new office buildings.
 - Special projects of national importance.

Assigning project delivery to NPMO's allows for more efficient delivery of projects, as NPMO's are the Centre of Excellence of project management and have strong ties to the Ministries via their support roles.



In due course, following training programs in project management and as ministries become more capable, NPMO involvement will become more of a regulator and a monitor. However, there will always be special projects that should be executed by the NPMO.

Legal backing and authority: Laws & Guidelines

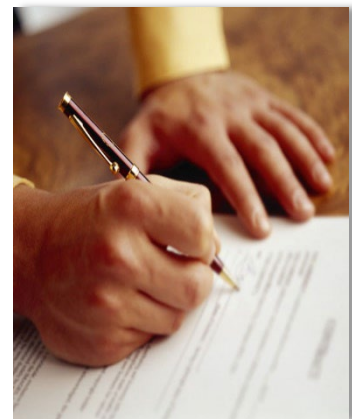
The NPMO is unlikely to achieve a systemic improvement in project management without strong and formal mechanisms for driving change. The EPMO's and Ministries of Finance and Budget might account for NPMO recommendations when making spending decisions but based on experience from the UK and Qatar that have relatively little or no laws and guidelines in place, if the ministries aren't under a formal obligation to follow them, they will most likely not do so. In that case, the NPMO would have to rely on personal credibility, collaboration, and informal influence, rather than having formal mechanisms, to achieve compliance with its recommendations.



The lack of delegated authority within ministries would also reduce the influence of the NPMO, limiting its ability to drive improvements in project management.

Laws and Guidelines should therefore be established with formal application mechanisms and approval processes for the various stages in the Stage-Gate process. Driving quality assurance in Feasibility studies, business cases and project prioritization should be the primary focus to obtain the greatest cost savings and highest project performance and benefits. Recruitment and formal training of quality project managers within the ministries' departments is equally important.

In order for the needed data to be captured in a consistent manner, that reflects metrics to be audited and accessed and examined by the NPMO, a streamlined set of templates needs to be put in place and used by all the participating agencies. These templates should not become self-serving, otherwise they will not be used effectively. They should not be complicated and lengthy. Again, competency in using the templates will need to be assessed and constantly reinforced to ensure homogeneity in reporting across the board. Research has shown that even in the most developed of countries this exercise will require constant review and enforcement



The Director of the NPMO should have a formal mechanism available, to set out his position if a project proceeds contrary to NPMO advice to cancel or re-scope. When ministers or officials reject NPMO recommendations, there should be a formal and transparent process in place to document it.

Talent development

A main role of NPMO's in the world is to improve the capability of project managers within ministries' departments and the NPMO's themselves. Challenges have emerged in NPMO's around the world, which undermine talent development initiatives. For example, turnover of senior responsible owners is high, with very few projects having had a single senior responsible owner from planning to delivery. Likewise, there are concerns around shortages of skills in specific areas such as feasibility studies, risk management and behavior change, which is problematic given the volume of transformational projects being undertaken.



The NPMO should establish a "NPMO University (NPMOU)" with a scope to target top decision-makers (including ministers) as well as project managers. The NPMOU should focus its efforts on training Senior Project Managers. It would also be beneficial to extend this support more widely, as it would help

to develop greater awareness of project delivery issues at the highest decision-making levels in government.

Incentives to retain project managers and to reduce turnover should be introduced, such as bonuses and/or accreditations. Having a NPMOU accreditation should be considered a privilege and an important achievement. Communication campaigns should be conducted to promote working for NPMO, and to make people feel that they are participating meaningfully in the economic and social wellbeing of their country. Such training, accreditation, participation, public honors and acknowledgement and monetary bonuses should be sufficient to attract talent from the private sector even though the remuneration might be lower in the civil service.



Shortages of skills in specific areas, needed to deliver the complex infrastructure and transformational change project, should be quickly identified, and addressed. Typically, this includes qualified planners to oversee quality feasibility studies, specialists in the fields of digital, legal, analytical, risk management and behavior change.

Developing talent will be strengthened via educational trips to other planning institutes and departments in the world, that have a long history and have acquired a high reputation in competency and excellence in order to get more familiar with international best practice in the planning, design and construction of infrastructure.

The NPMO should also develop and implement a tailored approach to improving the project delivery skills and awareness of ministers and permanent secretaries.

Delegation of authority within ministries

The delegation of authority and decision-making within the Ministries in less advanced countries is presently limited with a significant part of the decisions needing to travel up the organization structure to the minister's office for approval. This becomes particularly difficult, given the time constraints, when attempting to work collaboratively.



Delegation of authority needs to be vested with the individuals appointed as the primary contacts with the NPMO to ensure that decisions that need to be made can be complied with within the Ministry, in an expeditious manner to meet aggressive schedules.

Integrity of data

Even in the most progressive countries, there is always a struggle to obtain credible data. The UK, Australia, Scotland, Singapore etc. have all demonstrated the need for credible data. Historical data that is configured in a database, that allows its retrieval in a way that assists evaluation of potential new projects is sought after by just about every NPMO examined. Credibility of data included in business cases of new projects to be evaluated is also a priority.



The outcome is only as good as the data it is based on. As PMOs work cross sectors, there is an inherent tendency within each Ministry to retain, configure and present data in a way that best suits its own purposes. Hence the metrics used are not necessarily aligned. Data transparency is also an issue let alone the way its presented.

The NPMO should thus develop IT solutions in data reporting and sharing, based on consistent unified metrics, which are needed throughout the life cycle of a project.

Evidence-based audits

The UK, Scottish and the Australian models have been successful in their role due to public audits conducted to evaluate the performance of the respective NPMO's. Course adjustments, systems and process revisions conducted, based on evidence-based audits of existing conditions provide the necessary data to be measured against set KPI's. Interestingly, some of those audits were self-conducted and results published with improvements prescribed. This obviously demonstrates a high level of maturity and transparency. If such conditions do not exist, then the necessary feedback to improve the functioning of those PMOs would become static.



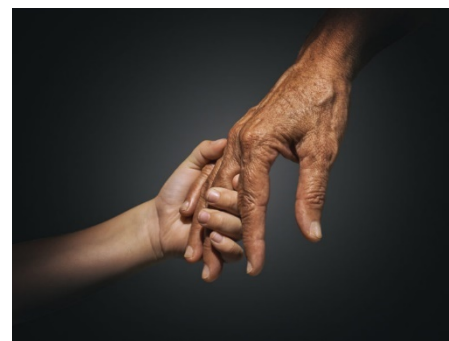
Promote collaboration

The framework designed by the NPMO and adopted by ministries should clearly define at which moments the ministries should seek advice and collaboration with the NPMO. This early, defined and iterative engagement will help the NPMO, and the stakeholders identify the project risks and ensure that adequate measures have been put in place to mitigate them. Typically, there is an early rush to get projects moving by the sponsor (ministry) at the expense of a more rigorous approach. The danger is when such evaluations are done after the fact, it becomes more a paperwork exercise. Given that this is a collaborative effort, the leadership of the NPMO should include individuals that are catalysts for collaboration. The leaders need to be well respected technically, as well as have the ability to create or foster a collaborative approach towards discharging their duties under their contract. This becomes acutely important if the NPMO has no executive powers.



Transitioning and legacy

The collaborative approach, the streamlined templates, the data credibility and configuration, projects progress evaluations are all conducive towards the institution of good competent leadership in the participating ministries. Henceforth, the institution of a strong NPMO does not lead to usurping authority of the ministries. On the contrary, it helps build leadership within the ministries to meet the challenge. This of course assumes that the ministries are committed to working with the NPMO for the greater benefit of the country. In certain countries, NPMOs provide leadership programs such as in Singapore and the UK to help the stakeholders and program sponsors deliver their projects. In other countries, such as Qatar or Gabon, the NPMO would effectively act as a fire-fighting service for ministries with very delayed projects. Transitioning at the end of the commission to allow the local takeover of the NPMO needs to be done with the proper succession measures in place. Therefore, identification of local talent and a properly configured succession plan is critical to its success.



Human resources

It is interesting to examine the number of people employed to fulfil the respective mandates in the selected 6 NPMO's:

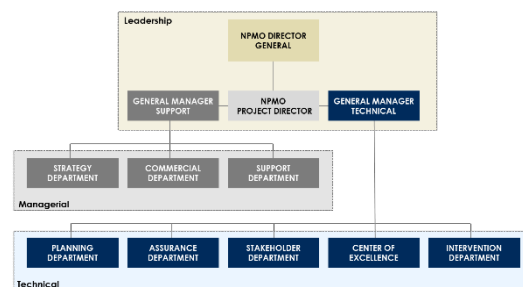
- IPA employs approx. 150 civil servants and private sector commercial experts. They are supported by a number of assessors who are brought in to assure individual projects.
- At its peak in 2014, ANGTI had 450 employees in total among which 40% were expat employees. Today, ANGTI counts 350 staff, among which 10% are expat employees.
- PIMAC employs a total number of 96 people in order to fulfil its mandate, which is essentially up-front planning (feasibility studies and business cases) of projects.
- IA employs 13 holders of public office (The Board and CEO) and a team of 16 in its office in Sydney, of these 7 were seconded from another Commonwealth entity. The total number of staff is thus 29.
- CPO is undergoing changes and the present structure is not known. At one point, CPO employed 180 people, and has had an average of 120 people in its 4-year existence.
- EPU has recently expanded its mandate to include private sector partnerships, long-term strategic research, and economic modelling. This new set-up employs a total of 397 people.



The spread is quite pronounced and is highly dependent on the level of maturity vis-a-vis competency in delivering projects on time, on budget, and to the desired quality level of the host country. An in-depth assessment and audit is needed prior to ascertaining the required number of personnel. This should include current competency of the existing delivery capabilities, the budgets, pipeline, and time frames.

NPMO and EPMO set up

Instituting an NPMO or an EPMO would require the participation of an internationally renowned consultant to create the structure of the NPMO, create the templates, processes, and procedures to be followed, drawing up the National Integrated Infrastructure Master plan, the stage gate process, the prioritization criteria, the project evaluation criteria, and instituting planning, engineering, project management and construction management based on International industry standards. The Consultant will help set up training programs and advise on talent retention plans, locate local talent to gradually infill the positions within the NPMO with local talent and leave a legacy of an organization to continue and improve its original mandate.



Conclusions

The analysis leads to the following key conclusions:

- In all cases studied, the end-user ministry is responsible for project delivery, while the NPMO may take responsibility for cross-sector projects of strategic importance. No model was found of a separate execution agency for project delivery.
- In the majority of countries studied, and those most relevant to the GCC, the NPMO is focused on EPMO assurance, enablement, and execution.



- Both developing and developed economies have established NPMOs as centers of excellence, stewards of the National Infrastructure Master Plan, and enablers of project delivery.
- In most cases studied, coherent infrastructure development is driven by three key factors:
 - An integrated National Infrastructure Master Plan that provides the roadmap to achieving the national strategic vision
 - The level of authority delegated to the NPMO, that enables it to plan and prioritize across ministries according to strategic needs
 - A collaborative and integrated infrastructure community, in which the NPMO acts as coach, guide and center of excellence for EPMO development.

References:

1. Gilbert + Tobin, *Australian Federal Budget 2020-21: The Infrastructure Package*, 6/10/2020
 2. Yeo Eng Ping, Amarjeet Singh, *Take 5 for Business, Malaysian Budget, Ernst and Young, Volume 8, issue 9-6 Nov. 2020*
 3. Modor Intelligence, *Infrastructure in South Korea, 2020*
 4. KPMG, *Saudi Arabia Budget Report 2021, December 2020*
 5. David Hawkes, *Spending Review, What it Means for Infrastructure, ICE, 26 Nov. 2020*
 6. Infrastructure Projects Authority, *National Infrastructure Delivery Plan 2016-2021, March 2016*
 7. Infrastructure Projects Authority, *National Infrastructure Construction Procurement Pipeline 2020/21, June 2020*
 8. Infrastructure Investment Board, *Infrastructure Investment Plan for Scotland 2021-2022 to 2025-2026, \$ February 2021*
 9. US General Services Administration, <https://www.gsa.org>
 10. Wikipedia, *General Services Administration*, https://en.wikipedia.org/wiki/General_Services_Administration
 11. Atlanta Regional commission, <https://atlantaregioal.org>
 12. *The Atlanta Region's Plan, Leading Metro Atlanta into the Future*, www.atlantaregionsplan.org
 13. Infrastructure Australia, *Infrastructure Priority List, Project and Initiative summaries, Feb 2021*
 14. Infrastructure Australia, *assessment of Australia's Future Infrastructure Needs, Infrastructure Audit 2019, June 2019*
 15. Korea Development Institute, *Public and Private Infrastructure management center*, https://www.kdi-re.kr/kdi_eng/kdicenter/PIMAC_organ.jsp
 16. Korea development institute, *Monthly Economic Trends 2021.5, May 10, 2021*
 17. Deloitte, *Public Infrastructure Prioritization, Three strategies to help maximize the impact of government spending*, <https://www2.deloitte.com/us>, 2020
 18. Daryl Walcroft, *Infrastructure Strategy and Planning for the Future*, pwc, 2020
 19. Oracle, *The Challenges of Managing Public Infrastructure projects, Discussion Paper, 2014*
 20. Ministry of Economic Affairs, *The Malaysian Economy in Figures 2019*, www.me.gov.my, Revised Dec 2018
 21. Economic Planning Unit, *Prime Minister's Department*, www.me.primuscore.com/en
 22. Government of Singapore, *Singapore Agency Website*, www.gov.sg
 23. Government of Singapore, *Ministry of Finance, Budgets 2021*, www.gov.sg
 24. Government of Singapore, *Singapore Government Agency Website, Center for Public Project Management CP2M*, www.gov.sg
 25. Ministry of Education, *Rwanda, Single Project Implementation Unit (SPIU)*, www.mineduc.rw
 26. Faithful and Gould, *Central Planning Office*, <https://www.fgould.com/middle-East/Projects/central-planning-office>
 27. Ministry of Finance, *Qatar State Budget 2021*, www.mof.gov.qa/en/pages/statebudget2021.aspx
 28. Modor Intelligence, *Infrastructure to hold major share in the Construction in Sector in Qatar, Qatar Construction Market | Growth, Trends, and Forecasts (2021 - 2026)* (mordorintelligence.com)
 29. Mashroat, <https://mashroat.gov.sa/en/about>
 30. Argaam, *Saudi Cabinet merges Mashroat with Center for Spending efficiency*, <https://www.argaam.com/en/article/articledetail/id/1445883>
-