

Delivering mega programs successfully

Opportunities to transform the building and construction industry

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EXECUTIVE SUMMARY

The building and construction industry in Gulf Cooperation Council (GCC)¹ countries is on the brink of a transformation that could ripple around the world. For the past 30 years, GCC governments have successfully deployed capital mega programs to diversify and expand their economies. From the creation of industrial port cities such as Yanbu and Jubail in Saudi Arabia, to the emergence of downtown Dubai, mega programs have created landmark places to live, work, and visit.

As of early 2020, close to 30 mega programs in the GCC construction delivery pipeline were expected to become largely operational over the next decade.² These projects represent around US\$1 trillion in investment, almost half of the region's total construction pipeline of \$2.3 trillion. They include urban regeneration programs, such as those focused on downtown Riyadh and Jeddah, large-scale smart cities, and other projects.

Achieving visionary feats requires discipline, and accordingly, the entire building and construction ecosystem is undergoing a fundamental, long-overdue transformation. The changes that took other industries several decades could take the GCC building and construction industry less than one decade.

As the industry develops at an unprecedented pace, collaboration among stakeholders including regulators, owners, investors, and suppliers—becomes pivotal to meeting ambitious time lines and to ensuring the enduring quality and resilience of the built environment. Stakeholders should have eight priorities:

- Develop a clear mega program strategy
- Use "industrialized" construction methods and next-generation materials
- Source strategically and resiliently
- Establish a fit-for-purpose governance and operating model
- Establish in-house centers of excellence
- Pursue digitization from the inception of the mega program
- Get the right talent
- Make environmental, social, and governance (ESG) concerns an imperative

THE FUNDAMENTALS OF THE BUILDING AND CONSTRUCTION INDUSTRY ARE CHANGING

The good news for the delivery of GCC capital mega programs is that the current state of the building and construction industry is untenable. The challenge is navigating the market while it is being reshaped. Understanding the nature of the trends shaping construction today can equip GCC mega program owners with the knowledge to drive a tailored, fit-for-purpose set of responses to make their programs a success.

To start, the nature of customer demand is becoming more complex and onerous. There is sustained cost pressure on construction customers, which makes it more important to deliver value for money. The public sector, in particular, will continue to face fiscal pressure. That means that public-sector projects must deliver value beyond building costs and consider the total cost of ownership throughout the asset life cycle (including operations). Construction customers are already becoming more discerning, seeking adaptable and multiuse structures, prefabrication and modular construction, sustainable materials and methods, superior safety performance, and digitization of their interactions with construction contractors during projects.

Persistent workforce challenges are also shaping the industry. A shortage of skilled and general labor poses difficulties for project delivery. The sheer size and timing of projects in the GCC region add further pressure on workforce supply. A crucial concern is to balance localization requirements — mandates for employers to hire workers who are nationals of the country, at sometimes specified rates — with the use of foreign workers. Moreover, the construction sector must keep pace with modernization efforts in methods, materials, and digitization. Training and reskilling programs for white- and blue-collar workers are necessary to ensure the workforce can adjust to new working norms.

Further, as safety and sustainability become critical themes for the sector and priorities for governments, the regulatory environment has to adapt by codifying, regulating, and enforcing standards in these areas. Although safety has already been a key focus for regulators and companies in the sector over the past decade, the GCC shows room for improvement when compared with the mature construction markets of Europe and North America. Globally, when it comes to sustainability, the former "nice to haves" are now becoming essential requirements. These include instituting a framework supportive of environmental, social, and governance (ESG) objectives to minimize the carbon footprint and improve environmental sustainability. Regulation is expected to mandate minimum standards, develop certification methods, promote modern methods of construction such as prefabrication and modular builds, and enforce green measures, thus enabling greater standardization across the entire building process.

The construction sector is expected to go through an "industrialization" process, following in the footsteps of other engineering-intensive industries such as automotive and aerospace. This shift will lead to a more standardized, consolidated, automated, and integrated GCC construction sector, with a reduced reliance on manual labor. Modular and prefabricated methods will gain prominence, supported by standardized, "productized"³ design libraries with clear variation parameters. Simultaneously, projects can acquire superior economics and improved physical properties from emerging new materials such as hydro ceramics, kinetic roads,⁴ green-mix concrete, self-healing roads, modular bamboo, and cross-laminated timber. Many of these materials are also lightweight and better suited to modular and prefabricated construction.

Digitization also continues to gain in importance as a critical enabler of industrialization and productization of the construction sector. Although Building Information Modeling (BIM) has been around for well over a decade, it has not yet reached its full potential. The benefits to date have been confined to a few value chain steps, primarily design and sometimes construction, but not asset operations. BIM can integrate digital data along the value chain and asset life cycle, optimizing outcomes in design, prefabrication, assembly, on-site construction, and asset operations and management. The benefits of digital solutions such as BIM include a reduction in engineering time of 30 percent, a reduction in construction costs of 10 percent, a reduction in maintenance and replacement costs of 20 percent, and a reduction in procurement costs of 5 percent.⁵ These improvements can be achieved through enhanced collaboration, drone-based site measurement, connected and autonomous construction equipment, smart maintenance and asset management solutions, and digitized procurement processes.

EIGHT PRIORITIES FOR SUCCESSFUL MEGA PROGRAM DELIVERY

To encourage the industry's transformation—and burnish the GCC's reputation as a global leader in mega programs—regulators, owners, investors, and suppliers must pursue eight priorities (see *Exhibit 1*).

EXHIBIT 1

Eight priorities for successful mega programs



Develop a clear mega program strategy

At the outset, it is critical to articulate a comprehensive delivery strategy for the mega program—including whether to build or buy the necessary capabilities or pursue a public—private partnership. This initial strategy decision can in turn define parameters for how to build: to advise and align decisions on contracting method, funding approach, technology deployment, value buying, and program operating model. The formulation of the delivery strategy should be supported by a robust assessment of the pros and cons of various delivery model options—for example, whether to self-develop, sub-develop, or pursue a partnership. Factors such as the strategic importance of the asset, desired stakeholder outcomes, required delivery capabilities, long-term funding capacity, and overall risk appetite are all essential criteria to aid decision-making.

Once a mega program delivery model is established, it is essential for all project-level delivery decisions to be consistent with this logic in order to avoid unnecessary complexity and potentially conflicting objectives. Indeed, as mega programs enter the planning and design stage of the project life cycle, the early decisions are critical. The delivery strategy should guide these decisions, as they have profound downstream implications. For example, the decision of whether to pursue modular design and the decision of which specific building materials to select affect the constructability and future operability of the asset. Changes in design and specifications are also among the main causes of project delays, so it is vital to get them right the first time.

Use "industrialized" construction methods and next-generation materials

Prefabricated and productized construction methods can yield significant efficiencies in terms of time, cost, productivity, accuracy, and quality. The net effect is one of "industrialization" of the construction process—shifting it from a highly labor-intensive, manual, and project-specific approach to a more automated, standardized, and controlled approach with a clear hierarchy of modules and components.

To reap the full potential of this shift, mega program owners should seek to establish real-time, integrated supply chains that seamlessly connect prefabricated component manufacturers, building material suppliers, logistics providers, and on-site contractors. By creating highly efficient and responsive construction supply chains, mega program owners could greatly enhance outcomes through optimizing production, delivery, and assembly activities, similar to industrial manufacturing processes.

Likewise, in terms of materials, mega program owners should ensure early incorporation of cutting-edge innovations that relate to attributes such as durability, performance, cost, and environmental sustainability. This proactive approach early in the design phase guards against short-term or suboptimal trade-offs. Moreover, deploying next-generation construction materials serves as a catalyst for accelerating the benefits derived from construction industrialization. For example, the use of lighter-weight materials that are easy to manufacture, such as cross-laminated timber or light-gauge steel framing, improves not only economies of scale in module production, but the associated logistics and transportation processes.





Source strategically and resiliently

Traditionally in the GCC, project procurement activities have been scoped and executed on a project-specific basis, and those making decisions have often prioritized price over quality, durability, and ecological merit. Moving forward, mega programs should seek to take advantage of the full suite of available strategic sourcing approaches across all projects to deliver maximum value. This includes taking advantage of scale benefits through volume aggregation and specification standardization across program projects, along with exploring opportunities for joint process improvements with suppliers, establishing strategic alliances and partnerships, pursuing global sourcing opportunities (where appropriate and compliant with local content requirements), and making procurement decisions based on total cost of ownership.

For mega program owners specifically, commercially viable joint ventures with building material suppliers can provide valuable supply chain resilience, with both local and (eventually) global supply partners. Indeed, adopting a more centralized, coordinated approach to procurement across a mega program can also enhance supply chain visibility, particularly when managing supply disruptions and constraints in a buoyant construction market.

Establish a fit-for-purpose governance and operating model

A well-designed governance and operating model is essential for the successful delivery of mega programs. It should provide effective checks and balances while avoiding unnecessary bureaucracy. That means implementing a consistent stage-gate process whereby projects proceed through identifiable phases that cover the entire program life cycle, establishing governance committees, creating a delivery operating organization and model, defining standards and procedures, and managing talent effectively.

By following a tailored stage-gate process from initiation to construction, handover to the owners/operators, operation, and maintenance, mega programs can ensure clear direction, greater flexibility, effective project oversight, and accountability for delivery. This structured approach to mega programs maintains high quality and governance standards, while promoting consistency across projects. Benefits of this stage-gate process include informed decision-making across phases, alignment of stakeholders, clearly defined activities and deliverables, and a transparent ownership and approval process.

Operating models play a vital role in mega programs by defining the roles, responsibilities, and authority of internal and external stakeholders throughout the program life cycle. An operating model operating model tailored to deliver mega programs facilitates cross-project coordination, synergies, and empowered decision-making for the delivery team. It also improves visibility for key stakeholders, minimizes isolated approaches, and ensures consistent progress of the program across stages. Reducing red tape and empowering on-site delivery teams with agile decision-making authority are critical to the progress of the project. Extending this collaborative environment to third parties involved in these developments can maximize value for all participants.

Establish in-house centers of excellence

Centers of excellence have the potential to greatly enhance the effectiveness of mega programs by facilitating knowledge sharing, ensuring compliance with technical standards, and driving innovation. A center of excellence defines policies, procedures, and standards, including material specifications; researches and adopts the latest trends; identifies innovative engineering and construction practices; and promotes the adoption of those practices in delivery. It also plays a crucial role in knowledge management by consolidating and disseminating lessons learned from different projects. Moreover, it promotes standardization by instituting an overarching project standards framework.

A mega program center of excellence could also provide advisory services to support construction teams in more effectively addressing complex matters. The center could deliver best-in-class consultancy services tailored to specific project needs by taking advantage of its extensive external knowledge base and capturing unique internal insights.

303

Pursue digitization from the inception of the mega program

Digitization is a fundamental enabler for unlocking significant benefits throughout the entire building and construction ecosystem and value chain. It enables more transparent, datadriven, real-time, and efficient decision-making. From their inception, mega programs should proactively use digitization to make the entire program life cycle easier to manage. At the heart of this approach is the full adoption of BIM as the single digital backbone for the mega program.

In the design phase, BIM creates a "digital twin" that seamlessly integrates information into the construction phase. Along with advanced analytics, BIM provides the relevant data set for digitizing scheduling and making it more efficient, and for budgeting, project management, procurement, and supply chain management. Digital tools such as virtual reality facilitate collaboration among design partners (architects, engineers, etc.) around the globe.

During construction, mega programs should seek to deploy internet of things (IOT, the network of connected devices) tools and solutions for on-site collaboration and efficiency. These include just-in-time provisioning, tool and equipment tracking, and drone-based surveying, all integrated into the single BIM backbone. Artificial intelligence and machine learning algorithms draw from these rich data sets, enabling optimized material planning and scheduling, as well as predictive quality assessment and reporting to improve risk management and mitigation outcomes.

In the operations phase, the BIM backbone, together with operational IOT tools and solutions, can enable the creation of truly smart buildings and infrastructure. Network-connected sensors, devices, and building automation systems allow users to track and monitor utilization and energy efficiency in real time and optimize maintenance requirements.

Get the right talent

Mega programs in the GCC must take proactive and targeted measures to mitigate the significant workforce challenges in the construction sector, specifically those related to labor availability and skilling. That requires formulating efforts aimed at specific job families.

White-collar workers such as those in project management, project controls, and engineering will be in high demand, requiring project owners to expend significant effort to secure the right talent. Blue-collar positions will be fewer in number as the industry moves toward industrialized methods of construction, which will shift labor requirements toward skilled workers involved in manufacturing assembly line processes. Although there is no quick fix to address these industry-wide workforce shifts, mega programs must develop superior employee value propositions to attract, develop, and retain the talent required for successful project delivery.

Mega programs must devote significant investment to people development and change management, particularly in the context of new digital tools, construction methods, and materials. Employees at all levels should be provided with opportunities to develop broader and more versatile skill sets that can adapt to the changing demands created by technological advances and value chain integration.

It is vital that mega programs cultivate their own unique sense of purpose that transcends the individual organizations involved. As marquee developments, mega programs hold intrinsic national importance, which can enhance employees' pride and motivation.

Make ESG concerns an imperative

ESG considerations are now primary rather than secondary to mega program development agendas because of their impact on livability. Such choices require conscious trade-offs on cost, time, quality of asset, quality of life, and asset usability dimensions. For example, developments are increasingly showcasing access to green spaces, ability to deploy micromobility solutions, live-work-play proximity, and carbon neutrality. Such requirements need to be agreed upon early in the asset brief development and design phase to ensure that desired outcomes are practically achievable.

From an environmental angle, mega programs must consider greenhouse gas emissions and factors such as mobility systems, water and power consumption, waste and resource management, recycling, and building materials and resource efficiency. From a social angle, they must incorporate health and well-being, diversity and social inclusion, community impacts, education and innovation, emergency response planning, and legacy planning dimensions. From a governance angle, it is imperative to build sufficiently robust checks and balances into the program operating model and governance construct to deliver on the environmental and social concerns. Sustainability funds provided by governments are an important enabler to cover the costs of ensuring ESG compliance.



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CONCLUSION

By taking full advantage of trends that are transforming and industrializing the construction sector, GCC mega program owners and policymakers can take a quantum leap forward in program delivery outcomes. The success of mega program delivery depends on carefully following all eight priorities over a multiyear journey.

Mega program owners can achieve timely and cost-effective program delivery and establish the requisite foundations for world-leading, future-proof construction supply chains, capability systems, and delivery disciplines. That in turn can generate a substantial economic dividend through enhanced economic value creation and increased employment as productivity improves, while also contributing to ambitious sustainability goals.

From a global perspective, the scale, scope, and ambition of GCC mega programs make them potentially transformative for the construction sector. There is a clear opportunity for mega programs to position the GCC construction sector as an exemplar on the global stage.

ENDNOTES

- 1. The GCC countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.
- 2. Karim Abdallah, Ramy Sfeir, Charly Nakhoul, and Fady Halim, "Managing the \$1 Trillion Wave of GCC Real Estate Megaprojects: The Institutional Setup," Strategy&, 2020 (https://www.strategyand.pwc.com/m1/en/reports/2020/real-estate-megaprojects.html).
- 3. Productized means that the product is designed in advance, with the client able to choose certain features, such as color and size. In that way, the construction company does not need to design a new building, such as an office block or a shopping center, from scratch each time.
- 4. Kinetic roads generate their own energy rather than allowing the energy of the vehicles traveling on them to dissipate. See *The Constructor*, "Kinetic Roads: The Future of Sustainable Transportation" (https://theconstructor.org/others/kinetic-roads-the-future-of-sustainable-transportation/572307/).
- 5. Strategy& Foresight, Volume 17: Industry 4.0—the Key to Success (https://www.strategyand.pwc.com/gx/en/alumni/news/foresight-volume17.html).

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