

Key questions to increase project owner's oversight in mega projects¹

Tariq Hussain, M.Eng., PMP

Abstract

Project organizations utilize a phase gate process for execution of mega projects and successful completion of all phases indicates that the project has been completed and has achieved its objectives set by project owner. This increases project owner's responsibility for oversight, project owners can accomplish this by asking some key questions about deliverables of each project phase which will increase their visibility and control, help keep track of progress of the phase deliverables, enable them to make informed decisions, help identify risks and address them proactively and ensures that the project teams attain the benefits of the phase gate process.

Background and Need

“Projects and programs are the vehicles for delivery of corporate strategies, effective project governance, within the corporate governance framework, has become a serious concern for organizations, offering company directors clear visibility and control of non-routine corporate operations and delivery capability” (Crawford, Cooke-Davies, 2005). “Effective management and oversight of complex construction projects is a critical challenge for project owners in the public sector” (Deloitte, 2007).

Project organizations utilize a phase gate process for execution of mega projects and by meeting the requirements of each phase they complete the projects successfully. The project owner's team reviews the phase gate requirements to pass the gate, which ensures that the project achieves its objectives for that phase and can move to the next phase. Successful completion of all phases indicates that the project has been completed and has achieved its objectives set by project owner.

¹ This paper was prepared as part of the author's final thesis for a Masters of Engineering degree at the University of Calgary in Alberta, Canada. Paper is published here with author's permission.

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Identify & Assess Opportunities	Select from Alternatives	Develop Preferred Alternative	Execute (Detail EPC)	Operate & Evaluate
Clearly Frame Goal	Generate Alternative	Fully Define Scope	Implement Execution Plan	Operate Asset
Test for Strategic Fit	Preliminary Development of Alternatives	Develop Detailed Execution Plan	Minimise Changes	Monitor & Evaluate Performance
Preliminary Overall Plan	Develop Expected Value	Refine Estimate	Finalize Operating Plan	Identify New Opportunities
Preliminary Assessment	Identify Preferred Alternative	Submit Funding for Approval	Business Plan for Phase 5	
~1% Engineering		~25% Engineering		
Phase 1 Estimate	Phase 2 Estimate	Phase 3 Estimate (+- 10% Accuracy)	Project Review	

AFE

Table 1.1: Phase gate process by Dr. Lavingia (2006).

This increases project owner's responsibility for oversight through all phases of the project in order to keep track of progress and make informed decisions. This paper recommends senior executives or project sponsors in project owner organizations to ask some key questions for each project phase to increase their oversight. These questions are focused on goals for each phase and must be answered by the project teams in addition to completing the checklist for each phase gate. These questions will help project owners to identify key deliverables for each phase, track progress of the key phase deliverables, move onto the next phase with confidence, make timely and informed decisions, identify risks and address them proactively, use archived data and lessons learned, and ensure that the project teams benefit from the phase gate process.

Questions for Phases 1

Phase 1 Questions
Identify & Assess Opportunities
What are the project goals? Does the project fit with the organization's strategy? What is covered in the initial scope? Was the preliminary assessment adequate? How much engineering did we do for phase 1? What did we do in the past that worked well? Do we have archived data from similar projects to use? Who are the stakeholders? Did we develop a schedule for the FEED phases? What top 10 risks were included in the phase 1 risk assessment? What does the level 1 schedule cover? What is included in the phase 1 estimate? What percentage of the estimate is for contingency?

Table 1.2: Key questions for the phase 1.

What are the project goals? It is crucial for organizations to ensure that project goals are clear to make project selection and gate decisions.

Does the project fit with the organization's strategy? Projects need to fit with the overall strategy of the organization to benefit from the organizational expertise and get approval for expenditure.

What is covered in the initial scope? The project scope and the complexity involved in execution need to be clearly understood.

Was the preliminary assessment adequate? A preliminary assessment is important to evaluate the need and prospects of the project.

How much engineering did we do for phase 1? Engineering helps to identify and clarify a project's scope and helps owners to plan well.

What did we do in the past that worked well? Past project experience can help project teams to plan well and use proven methods to overcome obstacles. Also, relevant lessons learned from the past projects can be very helpful during the initial project phase.

Do we have archived data from similar projects to use? Prior project data helps by comparing archived project data to the present project, so that the owner's team can set precise expectations and understand the complexity involved in the subsequent phases.

Who are the stakeholders? The first step in stakeholder management is the identification of all individuals, teams, agencies, and organizations who are project stakeholders. The researcher recommends that project owner organizations identify project stakeholders during phase 1; early stakeholder identification will enable project owners to assess their needs and develop an effective stakeholder management plan.

Did we develop a schedule for the FEED phases? It is important to develop a detailed schedule that covers the FEED deliverables with timelines; this timeline provides a target to achieve and the schedule can also be used to track progress and performance during FEED phases and for phase gate reviews.

What top 10 risks were included in the phase 1 risk assessment? Strategic risks should be identified and assessed and a mitigation plan should be developed to properly plan for the subsequent project phases.

What does the level 1 schedule cover? The Level 1 schedule for the whole project needs to address all the key milestones and regulatory and gate requirements.

What is included in the phase 1 estimate? What percentage of the estimate is for contingency? The phase one estimate is very high level and it is important for the senior executives to understand the basis and explanations of the estimate to make informed phase gate decisions.

Questions for Phase 2

Phase 2 Questions
Select From Alternatives
What are the alternatives and how many are there?
What is the expected value? What did we consider?
How did we identify the preferred alternative?
How much engineering is completed for a 10% model review?
How did we estimate the key quantities?
What are the needs of the stakeholders?
Did we identify long lead items and plan for their procurement?
What did we do in the past that worked well?
What top 10 risks were included for phase 2 risk assessment?
Did we use lessons learned? Did we capture new lessons learned?
What did we cover in the phase 2 estimate and schedule to make an informed gate decision?

Table 1.3: Key questions for the phase 2.

What are the alternatives and how many are there? The owner needs to understand the development of alternatives, their basis for comparison, and select the preferred one.

What is the expected value? What did we consider? Project owners use the expected value to calculate the investment and select the most likely scenario that could give them the desired outcome. It also provides owners with the amount of risk involved in each scenario, which helps them make project funding decisions.

How did we identify the preferred alternative? It's important for an owner to understand the basis for selecting a preferred alternative to develop one alternative and obtain budget approval.

How much engineering is completed for a 10% model review? Engineering helps to identify and clarify the project's scope and helps owners to plan well. A 10% model review is suggested to improve the accuracy of the estimate.

How did we estimate the key quantities? Key quantities are used to determine piping, steel, and bulk quantities for the project and these estimated quantities are used to estimate the project cost.

What are the needs of the stakeholders? For phase 2, the researcher recommends that organizations conduct a detailed stakeholder analysis to understand their role, influence, authority, aspirations, needs, and the relationship of all these factors to the project execution. Stakeholders and their requirements should be prioritized to address the factors appropriately.

Did we identify long lead items and plan for their procurement? Long lead items are the specialized equipment that requires a significant amount of time for design, fabrication, and delivery; project owners need to identify the long lead items and plan for their procurement during phase 2.

What did we do in the past that worked well? Past project experience can help project teams to plan well and use proven methods to overcome obstacles. Moreover, the use of value improving practices can help improve the project team's efficiency and save time by utilizing tested practices.

What top 10 risks were included in the phase 2 risk assessment? During phase 2, the project manager is assigned to the project with some key project team members. The project risks from phase 1 should be reviewed. The project risks should be updated by performing another risk assessment based on the phase 2 data; the top 10 risks should be identified and a mitigation plan should be added to the phase 2 estimate and schedule for high probability risks that have a high impact.

Did we use lessons learned? Did we capture new lessons learned? Organizations should start capturing lessons learned during phase 2, in addition to using lessons learned from the database.

What did you cover in the phase 2 estimate and schedule to make an informed gate decision? Project owners use the phase 2 estimate and other phase two deliverables to make phase gate decisions and, therefore, the details of the estimate components, their basis, and the way the estimate was developed gives owners confidence in making informed phase gate decisions.

Questions for Phase 3

Phase 3 Questions
Develop Preferred Alternative
What is included in a fully defined scope?
How detailed and complete is the project execution plan?
What has been prepared to request funding approval?
How much engineering was done to do a 30% model review?
How will stakeholder's needs be managed?
When do we order long lead items?
What did we do in the past that worked well?
What top 10 risks and mitigations were included in the budget and schedule?
Did we use lessons learned? Did we capture new lessons learned?
What does the phase 3 estimate cover to meets the gate 3 requirements?
What is included for a contingency?

Table 1.4: Key questions for the phase 3.

What is included in a fully defined scope? During phase 3, the project scope is fully defined and project owners need to understand what is included in the project scope, what is out of scope, and the complexity involved in project execution. This scope is used to prepare project execution plan, phase 3 estimates and the phase 3 schedule, also a clearly defined scope provides owners' with confidence to make informed phase gate decisions.

How detailed and complete is the project execution plan? The project execution plan is the main governing document for the project that describes the project scope, establishes the means to execute the project, and identifies tools to monitor and control the project. The project execution plan covers all the activities that will be performed during project execution. The project execution plan is the primary governing document between the owner and EPC companies, so the completion of the project execution plan will empower the project management team to execute, control, and deliver the project effectively.

What has been prepared to request funding approval? Request for funding is the most critical part of the front end loading and preparing a complete funding application, supported with reliable data, will help project teams build a solid case for approval and for organizations to make confident decisions.

How much engineering was done to do a 30% model review? As described earlier, by conducting a 30% model review, organizations will be able to more accurately estimate quantities of pipe, steel, instruments, and bulk items, which will provide more accurate input for the overall estimate.

How will stakeholders' needs be managed? For phase 3, organizations should develop a detailed stakeholder management plan, assign responsibilities for project stakeholder management across project organization, and make certain that stakeholder management is well understood and followed to support a smooth project execution.

When do we order long lead items? Long lead items are critical for the project and placing purchase orders early in the project for these items ensures design, approval, fabrication, testing, and delivery on time. Any delays in ordering long lead items can cause delays to project completion; it is imperative for owners to ensure that long lead items are ordered on time, the risks related to long lead items are included in the risk register, and any mitigations required are in place.

What did we do in the past that worked well? Past project experience can help project teams to plan well and use proven ways to overcome obstacles. Moreover, the use of value improving practices can help improve the project team's efficiency and save time by utilizing tested practices.

What top 10 risks and mitigations were included in the budget and schedule? Organizations are strongly advised to conduct a project risk assessment in every phase of the project to identify new project risks, pick top 10 risks that potentially have a high impact on the project execution, prepare a risk mitigation plan to address these risks, and add these mitigations to phase 3 cost estimates and schedules.

Did we use lessons learned? Did we capture new lessons learned? During phase 3, the project teams should capture new lessons learned that can be used in the future and use lessons learned from previous projects to develop a good project execution plan and request for funding.

What does the phase 3 estimate cover to meet the gate 3 requirements? What is included for a contingency? Once the approved phase 3 estimate and schedule become the project baselines, during the execution phase, the progress and performance are measured against this baseline. Therefore, it is key for organizations to add numerous details in the phase 3 estimate to capture all the estimate components and also to provide details on what is included as a contingency and what is not included.

Questions for Phase 4

Phase 4 Questions
Execute (Detail EPC)
How are we progressing with the project execution plan?
How effectively has the change control system been applied?
What tools do we have in place to facilitate project coordination? How are we facilitating coordination among contractors?
Did we finalize the operating plan?
How are we tracking progress and performance?
Is the construction completion sequences as per the commissioning sequence?
What did we do in the past that worked well?
How well are stakeholder's needs being managed?
How well aligned is the commissioning and start up schedule?
What are the top 10 risks and how are these being mitigated?
What is the status of the business plan for phase 5?
Did we use lessons learned? Did we capture new lessons learned?
Are we ready for a project review?

Table 1.5: Key questions for the phase 4.

How are we progressing with the project execution plan? The project execution plan is the main governing document that covers key project milestones and deliverables; organizations are required to closely monitor progress against these deliverables and key milestone targets.

How effectively has the change control system been applied? Changes during mega projects are inevitable and organizations need to have a solid change management plan in place to deal with the changes during project execution. The effective application of a change management plan will ensure that all changes are being evaluated as to how they may affect project scope, quality, cost, and schedule before approvals.

What tools do we have in place to facilitate project coordination? How are we facilitating coordination among contractors? Project coordination and interface management is part of the project execution plan. Organizations are required to lead and facilitate effective coordination and manage interfaces among various functions and contractors to facilitate smooth project execution and avoid delays.

Did we finalize the operating plan? Project owner organizations must involve their operations team to provide input into the engineering design and develop a transition plan with details on how the project will be handed over to the operations team after mechanical completion.

How are we tracking progress and performance? Progress and performance measurement can be done in different ways using various tools; organizations are strongly advised to benchmark their progress and performance measurement tools with industry practices and select the most appropriate for their project.

Is the construction completion sequence as per the commissioning sequence? Project owner organizations are responsible to finalize a scope split among mechanical completion, pre-commissioning, commissioning and start-up, and plan and monitor construction against the finalized sequence.

What did we do in the past that worked well? Past project experience can help project teams to plan well and use proven ways to overcome obstacles during project execution. Further, the use of value improving practices can help improve the project team's efficiency and save time by utilizing tested practices.

How well are stakeholder's needs being managed? During phase 4 of the project, organizations must ensure that a stakeholder management plan is implemented effectively; the effective implementation will ensure that all stakeholder requirements are met across the project organization.

How well aligned is the commissioning and start-up schedule? Project owner organizations must ensure that the commissioning and start-up schedule is aligned with the requirements of the operations team and they must monitor progress against that sequence so that the project is handed over as per the operations team's requirements.

What are the top 10 risks and how are these being mitigated? Risk is very high during the execution phase and the owner organizations are strongly advised to continuously conduct risk assessments, frequently update the project risk register and pick the top 10 risks that have a high impact on the project execution, and prepare and implement mitigations to address these risks.

What is the status of the business plan for phase 5? The business unit, which will own the new asset after completion, is required to prepare and obtain all necessary approvals for the business plan so that they can acquire and operate new assets successfully.

Did we use lessons learned? Did we capture new lessons learned? Phase 4 of the project is the action phase and multiple stakeholders are involved during this phase; it is important for the project team to capture new lessons learned that can be used in the future and use lessons learned from other projects to facilitate a smooth project execution.

Are we ready for a project review? The project owner's team is required to collect and document all the important project data so that it can be used for the project review. The researcher strongly recommends that owner organizations add this action as a key milestone in the project execution plan and assign it to the project manager to ensure that this task is accomplished on time.

Questions for Phase 5

Phase 5 Questions
Operate & Evaluate
How well were commissioning and start up accomplished?
Was the system turn over completed flawlessly?
Are we ready to operate the asset?
What tools do we have in place to monitor and evaluate performance?
How well are stakeholder's needs being managed?
Were lessons learned captured for all project phases and posted to company lessons learned database?
What type of project data was archived?
Are we actively identifying new opportunities?

Table 1.6: Key questions for the phase 5.

How well were commissioning and start-up accomplished? The project commissioning and start-up sequence is aligned with the operations team's requirements and the project owner's team monitors the progress against this sequence; any changes to this sequence can cause delays and a small delay can cause an organization to lose millions of dollars, so it is critical for project owners to monitor, control, and support all the commissioning and start-up activities.

Was the system turn over completed flawlessly? System turnover is one of the most critical activities near the end of the project and flawless completion is valued as a great success for both the project and organization. The project owner's team must make sure that the commissioning, start-up, and system turnover sequence is aligned with the operations team's requirements and all these activities are accomplished without any errors.

Are we ready to operate the asset? Apart from a successful system turnover and completion, the project owner's operations team must have a realistic operating plan in place, all regulatory and operational requirements met, and a trained team ready to operate the new asset efficiently.

What tools do we have in place to monitor and evaluate performance? Along with operating plan, project owners also need to have adequate tools in place to monitor and evaluate the performance of the newly acquired asset.

How well are stakeholder's needs being managed? Typically, most of the stakeholders involved during phase 5 are internal to the organization. The project management team must ensure that the stakeholder's requirements are addressed during this phase and proper communication, project close-out reports, lessons learned, and the data archives are addressed and updated.

Were lessons learned captured for all project phases and posted to the company's lessons learned database? Large organizations have multiple business units that operate as independent business units. The researcher highly recommends that a system is in place where all the project's lessons learned are captured during the life cycle of the project so that the other project teams can benefit from the lessons learned.

What type of project data was archived? Mega projects have a huge amount of data stored in multiple formats; organizations should have a system in place to archive various types of data in different formats and have various levels of access to authorize users to obtain the right type of data.

Are we actively identifying new opportunities? Active identification of new opportunities to achieve necessary growth, expand operations, maintain competitiveness, and keep the current operations running is one of the key objectives of any organization to keep the organization profitable.

Conclusion

Owner's oversight in mega projects is critical to make timely and informed decisions and to keep projects on track. Researcher recommends project owners to ask some key questions during each project phase to increase their visibility and to make informed decisions. These questions will help increase project owner's oversight by; increasing focus on key deliverables for each phase, keep track of progress of these deliverables, enable project teams to identify risks and address them proactively, use archived data and lessons learned, ensure that the project teams attains the benefits of the phase gate process and projects complete successfully and achieve desired objectives.

References

Crawford, L.H. & Cooke-Davies T.J. (2005). Project Governance - The Pivotal Role of the Executive Sponsor: PMI Global Congress Proceedings – Toronto, Canada.

Deloitte Financial Advisory Services. (2007). Major Construction Projects: Improving Governance and Managing Risks. Deloitte Development LLC. Accessed June 27, 2012. www.deloitte.com.

Lavingia.N.J. (2006). How to Create a World Class Project Management Organization. 2006 AACE International Transactions. Retrieved from <http://www.aacei.org>.

About the Author



Tariq Hussain

Calgary, AB, Canada



Tariq Hussain holds a Master's of Engineering degree in Project Management from the University of Calgary and a Project Management Professional (PMP) designation. He received his BSc in Pakistan. Tariq has over 20 years of experience working in planning & scheduling and project management fields, in oil and gas, power transmission, telecommunication and pharmaceutical industries. His current research interests include PMO, project governance and the governance of mega projects in the oil and gas industry. Mr. Hussain can be contacted at thussain@ucalgary.ca