19th Annual Regional Audit Conference

“How to be Efficient and Innovative while auditing Capital Projects”
KEY OBJECTIVES

Understanding the need of capital project auditing

Glance through transformation journey of capital project audits

Exploring efficient & innovative tools & techniques to audit capital projects

Adopting comprehensive and proactive approach

How disruptive technologies will drive capital projects in future
WHERE DO WE STAND TODAY?

Have you identified all potential risk areas within your major projects?

Are repeatable program and project management methodologies, processes and controls consistently utilized by your organization?

Are technology enablers used to their fullest potential to efficiently analyze, manage and report project performance?

Does your organizational structure support effective program and project management and execution?

Are your critical projects on time and on budget?

Can your organization handle potential claims resulting from project activities?

INITIATE

PLAN

DESIGN

PROCURE

CONSTRUCT

COMMISSION

CLOSEOUT

OPERATE
NEED OF CAPITAL PROJECT AUDITING
UNDERSTANDING CAPITAL PROJECTS

Capital project is a long-term, capital-intensive investment project with a purpose to build upon, add to, or improve a capital asset. They are defined by their large scale, large cost with extensive planning & resources.

<table>
<thead>
<tr>
<th>Economic Infrastructure</th>
<th>Social Infrastructure</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roads &amp; Bridges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Railways</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban mass transit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo and Logistics centers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Energy &amp; Utilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Generation, Transmission &amp; Distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water &amp; Sewage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas storage and distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing &amp; processing plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals &amp; Mining</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Infrastructure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Townships / Smart City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports stadiums &amp; facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convention centers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Zones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Facilities &amp; Free Zones</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecom</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Investors - Owners – Developers – EPC’s – Contractors – Banks - Operators - Authorities
GLOBAL PROJECTED CAPITAL PROJECT SPEND - US$ 43 TRILLION, UPTO 2025

- **US/Canada**: $6.5 T
- **Europe**: $9.1 T
- **Asia/Oceania**: $13.8 T
- **South & Latin America**: $7.4 T
- **Africa**: $2.8 T
- **Middle East**: $3.5 T

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization's internal use only and should not be copied or distributed to any third party.
GLOBAL CAPITAL PROJECT LANDSCAPE

Canada
- Aging workforce
- Transitional workforce
- Globalization of EPC resources
- Limited specialty engineering and project management resources

USA
- Globalization of EPC resources
- Increased environmental requirements
- Increased contracting needs
- Increased regulatory requirements

Brazil
- Globalization of EPC resources
- Limited specialty engineering and project management resources
- Increased environmental requirements
- Increased in country content needs

North Sea
- Aging workforce
- Globalization of EPC resources
- Limited specialty engineering and project management resources

Angola
- Limited specialty engineering and project management resources
- Increased environmental requirements
- Increased in country content needs

Russia
- Limited EPC access
- Political stability
- Corruption
- Logistics
- Increased Arctic exploration

China
- Growing mfg. & construction capabilities
- Rising labor costs
- Growing specialty engineering and project management resources

Korea
- Growing construction capabilities

Japan
- Growing specialty engineering and project management resources

Nigeria
- Transitional workforce
- Globalization of EPC resources
- Limited specialty engineering and project management resources
- Strong competition for construction resources
- Strong focus on in-country content

India
- Growing Mfg. / specialty engineering and project management resources
- Corruption
- Strong focus on in-country content

Middle East
- Limited specialty engineering and project management resources
- Fast track projects

South East Asia
- Growing specialty engineering and project management resources

Australia
- Transitional workforce
- Globalization of EPC resources
- Limited specialty engineering and project management resources
- Strong competition for construction resources
- Strong focus on in-country content

South Africa
- Long term Government policies
- Globalization of EPC resources
- Skills development to fill specialty engineering and project management resources

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization’s internal use only and should not be copied or distributed to any third party.
GCC CAPITAL PROJECT SPEND

Overall GCC Market - $2.8 T (5300 Active Projects)

GCC - Sector Split

UAE - Sector Split

Key Highlights

• Almost 80% of large projects are over budget in terms of cost and approx. 20% in term of schedule;
• $31 MN average value of dispute;
• 30% projects on HOLD;

Source: meedprojects.com.
CAPITAL PROJECTS ARE BECOMING INCREASINGLY COMPLEX AND EXPENSIVE

An industry survey conducted by the Construction Management Association of America (CMAA) indicates that 40-50% of major construction projects run longer than planned and incur significant cost overruns. [http://www.cmaanet.org](http://www.cmaanet.org)

According to The Association of Certified Fraud Examiners (ACFE), the global cost of fraud and corruption in the construction industry could result in potential annual losses to owners in excess of $1.5 trillion by 2025. [http://www.aconex.com](http://www.aconex.com)

Major Capital Projects encounter significant planning, design, construction, commercial & closeout challenges to meet cost, schedule, quality and safety objectives, which may result in erosion of shareholder value and ROI before project completion;

Typical Capital Project Cost Breakdown

- Engineering Management – 3%
- Project Management – 3%
- Construction Management – 5%
- Construction – 38%
- Engineered Equipment – 15%
- Bulk Materials – 18%
- Engineering – 11%
- Other – 6%
- Startup Effort – 1%
KEY CHALLENGES ACROSS CAPITAL PROJECT VALUE CHAIN

Project Phase

Develop
- Assess
  - Concept approval
- Select
- Define
- Engineering
- Procurement
- Construction
- Commissioning
- Operations, maintenance
- Decommission

Execute
- FID
- Construction start
- First production
- Value delivery
- Asset closure

Operate

Decommission

Challenges

A. Selecting the right projects and optimizing capital allocation

B. Getting the plan right and then executing on budget and schedule

C. Adequately balance EPC risks

D. Integrating information from different disciplines and stakeholders involved in the project for proper decision making

E. Changing business and regulatory contexts

F. Managing and optimizing talent availability

G. Achieving effective handover & ramp up

H. Developing the right offer to the country and managing local content

Macro Influences includes:
- Unstable global market conditions
- Commodity Prices
- Highly competitive landscape
- Rapid technological advancement etc.
KEY STAKEHOLDER CHALLENGES

**External Challenges**

- Client decision making: 39%
- Contractual disputes: 50%
- Availability of skilled resources in the market (e.g., engineers, technical specialists): 37%
- Availability of funding: 47%
- Political instability and geopolitical issues: 42%
- Market volatility: 35%
- Availability of labour in the market: 17%
- Attracting the right suppliers: 35%
- Supply chain capacity/performance: 21%
- Fluctuation in materials and costs: 16%
- Security: 12%

**Internal Challenges**

- Time performance (delivering projects within planned timelines): 61%
- Risk management (identification, management, mitigation and monitoring of risks): 44%
- Financial performance (delivering projects on budget): 39%
- Systems, processes and technology (budgeting and cost management, scheduling, document management): 33%
- Governance (direction and oversight of projects): 28%
- Organisational capability (technical and project management skills within the organisation): 20%
- Decision making (securing approvals for critical decisions in a timely manner): 39%
- Change management (capture, analysis and execution of project changes): 17%
- Management information (visibility of project performance and costs): 16%
- Delegation of authority (empowerment of individuals to make decisions): 20%
KEY RISKS ACROSS PROJECT PROCESS

Financial Risks
- Misinterpretation of contract clauses
- Inadequate contract admin. process
- Recording/drafting of claims
- Issues in Final Account Settlement

Governance Risks
- Process & Regulatory Delays
- Inconsistent Reporting

Commercial Risks
- Fraudulent activities
- Realistic Schedule
- Improper cost to complete assessment
- Drop in Productivity of Resources

Cost & Schedule Risks
- Issues in Project Funding
- Estimation Errors
- Improper cost to complete assessment
- Drop in Productivity of Resources
# Detailed Project Risks

## Initiate
- Project funding not approved
- Undefined project organization
- Lack of delegation of authority
- Project Charter not documented
- Project feasibility not established
- Poor scope definition
- Unrealistic development timeframe
- Inadequate PM resources
- Environmental and regulatory assessments not performed

## Plan
- Lack of PM processes, controls, systems and protocols
- PM plans do not address all risks
- Inadequate resource estimating
- Ineffective stakeholder input
- Lack of PM technology tools
- Lack of contingency planning
- Lack of regulatory pre-approvals
- Project program not validated
- Lack of QHSE planning

## Design
- Poor design management
- Uncontrolled design changes
- Value engineering not performed
- Constructability not performed
- Design errors and omissions
- Lack of design performance
- Lack of stakeholder design input

## Procure
- Lack of competitive procurement
- Lack of transparent Award process
- Project delivery, contracting and packaging strategies not defined
- Bid collusion and fraud
- Selection of unqualified vendors
- Allocation of contractual risk
- Lack of contractor pre-qualification
- Hidden contingencies in bids

## Construct
- Regulatory noncompliance
- Improper construction sequencing
- Unforeseen site conditions
- Contract noncompliance
- Poor risk management
- Inadequate QHSE monitoring
- Poor sub-contractor management
- Inaccurate progress reporting
- Inadequate cost control
- Uncontrolled changes

## Commission
- Lack of commissioning plans
- Inspections and testing failures
- Integrated testing not performed
- Training not conducted
- Lack of operating approvals/NOCs
- Poor systems integration

## Close
- Pending punch list work
- Lack of completion certificates
- Final project signoffs not obtained
- Noncompliance with project closeout
- Unresolved claims and disputes
- O&M manuals and warranty
  - Completed contracts not closed
  - Lack of defect liability and warranty

## Operate
- Lack of facility management plans
- Asset management plan not in-place
- Safety procedures not operational
- Documentation issues
TRANSFORMATION JOURNEY OF CAPITAL PROJECTS AUDITING
EVOLUTION JOURNEY OF CAPITAL PROJECTS

TAJ MAHAL, INDIA

Construction Time Period: 1631-1648 (17 years)
Project Cost: 485 MN USD

Traditional

↓ Time  ↓ Cost

Improved efficiency

Mitigated Risk

Better controls

Innovative systems

Hand Drawing

BURJ KHALIFA, UAE

Construction Time Period: 2004 – 2010 (6 years)
Project Cost: 1.5 BN USD

Modern

↑ Time  ↑ Cost

Evolution

3D BIM Model
COMMON CHALLENGES FACED IN AUDITING OF CAPITAL PROJECTS

1. Unique Project risks
2. Lack of standard project documentation/data
3. Sample & documents extensive
4. Complex nature of contracts
5. Lack of in-house technical skills
6. Multiple stakeholders

Sample: An extensive set of project documentation and data is required to ensure thorough auditing. This can be challenging if the project involves complex nature of contracts, having multiple stakeholders, and requiring in-house technical skills. Unique project risks also add to the complexity.

For your organization's internal use only and should not be copied or distributed to any third party.
TRANSFORMATION JOURNEY (EFFICIENT & INNOVATIVE WAY OF PERFORMING CAPITAL PROJECTS AUDIT)

**Generalists**
- Finance & Accounting
- Chartered Accountants
- Engineers

**Strong Specialization**
- Contracts & Claims
- Quantity Surveying
- Planner / Architects
- Cost & Commercial
- Quality & Safety

**Compliance Focused**
- Milestone based reviews
- Internal controls evaluation
- Governance based

**Customized Solutions**
- Mix of Process & Project based approach
- Focus on core areas like Schedule Quality Reviews, Cost Recovery, Contract Performance, Operational Readiness etc.
- Involvement from beginning / key stages

**Data Driven & Tool based**
- Monte Carol Risk analysis
- Primavera P6 & Deltek Acumen
- Drone based reporting
- Process Mining, Data Analytics, RPA
- Project Database & Best Practices

**Standard Tools**
- ERP systems – SAP, Oracle
- Accounting Software – Tally
- MS Office – Excel & MS Project

**People**

**Process**

**Technology**

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization’s internal use only and should not be copied or distributed to any third party.
## SCHEDULE MANAGEMENT REVIEWS

**OBJECTIVE**

Provide independent assurance on quality of project schedule including success rate of project completion using various schedule analysis tool and benchmarking techniques.

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Challenges</th>
<th>Efficient Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Auditors</td>
<td>• Difficult to give realistic assurance on project timeline completion;</td>
<td>Industry &amp; Functional Expert with Primavera skills</td>
</tr>
<tr>
<td>Review limited to compliance,</td>
<td>• Schedule quality issues such as activities with missing logic, hard</td>
<td>Comprehensive schedule review – Work Front loading, productivity analysis,</td>
</tr>
<tr>
<td>project milestones, etc.</td>
<td>constraints, negative logic were not identified;</td>
<td>resource loading, etc.</td>
</tr>
<tr>
<td>No tools used</td>
<td>• Inadequate risk factoring;</td>
<td>Primavera P6, Deltek Acumen Fuse &amp; Monte Carlo Simulation to assure on project</td>
</tr>
<tr>
<td></td>
<td>• Schedule quality improvisation</td>
<td>completion</td>
</tr>
<tr>
<td></td>
<td>• Rigorous schedule tracking and monitoring</td>
<td>• Realistic project timelines using risk based approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Confidence in timely project completion</td>
</tr>
</tbody>
</table>

**PEOPLE**

**PROCESS**

**TECH**

**BENEFITS**

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization's internal use only and should not be copied or distributed to any third party.
<table>
<thead>
<tr>
<th>SCHEDULE MANAGEMENT REVIEWS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic</strong></td>
</tr>
<tr>
<td>- No Alignment of master</td>
</tr>
<tr>
<td>schedule with Management</td>
</tr>
<tr>
<td>objective.</td>
</tr>
<tr>
<td>- Absence of In-build</td>
</tr>
<tr>
<td>buffer in project</td>
</tr>
<tr>
<td>schedule.</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
</tr>
<tr>
<td>- Inadequate assumptions</td>
</tr>
<tr>
<td>supporting schedule</td>
</tr>
<tr>
<td>- Inadequate scope</td>
</tr>
<tr>
<td>coverage in master</td>
</tr>
<tr>
<td>schedule.</td>
</tr>
<tr>
<td><strong>Compliance</strong></td>
</tr>
<tr>
<td>- Absence of schedule</td>
</tr>
<tr>
<td>management procedure.</td>
</tr>
<tr>
<td>- No Master schedule</td>
</tr>
<tr>
<td>prepared in line with</td>
</tr>
<tr>
<td>schedule management</td>
</tr>
<tr>
<td>procedure.</td>
</tr>
<tr>
<td><strong>Financial</strong></td>
</tr>
<tr>
<td>- Absence of progress</td>
</tr>
<tr>
<td>update on master</td>
</tr>
<tr>
<td>schedule periodically</td>
</tr>
<tr>
<td>till baseline schedule</td>
</tr>
<tr>
<td>preparation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Design &amp; Plan</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Schedule not</td>
</tr>
<tr>
<td>prepared as</td>
</tr>
<tr>
<td>per procurement</td>
</tr>
<tr>
<td>and execution</td>
</tr>
<tr>
<td>strategy.</td>
</tr>
<tr>
<td>- Unrealistic</td>
</tr>
<tr>
<td>development</td>
</tr>
<tr>
<td>time frame.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Procure</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Poor</td>
</tr>
<tr>
<td>procurement</td>
</tr>
<tr>
<td>planning.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Deliver</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Non-alignment</td>
</tr>
<tr>
<td>of project</td>
</tr>
<tr>
<td>schedule with</td>
</tr>
<tr>
<td>strategic vision</td>
</tr>
<tr>
<td>- Absence of</td>
</tr>
<tr>
<td>detailed schedules</td>
</tr>
<tr>
<td>updates and</td>
</tr>
<tr>
<td>forecast impact</td>
</tr>
<tr>
<td>on completion.</td>
</tr>
<tr>
<td>- Inadequate Delay</td>
</tr>
<tr>
<td>Assessment &amp;</td>
</tr>
<tr>
<td>Recovery Plan.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Handover</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Absence of</td>
</tr>
<tr>
<td>Project</td>
</tr>
<tr>
<td>close-out</td>
</tr>
<tr>
<td>documents.</td>
</tr>
<tr>
<td>- Absence of</td>
</tr>
<tr>
<td>As-Build</td>
</tr>
<tr>
<td>schedule</td>
</tr>
<tr>
<td>- Absence of</td>
</tr>
<tr>
<td>Handover</td>
</tr>
<tr>
<td>schedule</td>
</tr>
<tr>
<td>and punch</td>
</tr>
<tr>
<td>points.</td>
</tr>
</tbody>
</table>
KEY OUTPUTS

**Forecasted Projection**

<table>
<thead>
<tr>
<th>Project Start</th>
<th>Data Date</th>
<th>Planned Project Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Jul-17</td>
<td>25-Sep-18</td>
<td>1-Jul-19</td>
</tr>
</tbody>
</table>

**Progress Achieved**: 42.66%

**Balance to be Achieved**: 57.02%

**Historical Average Progress**: 2.83% per Month

**Average Progress required**: 6.33% per Month

**Work package** Phase A1: 1-Jul-19

**Completion Date**: 1-Jul-19

**Program name as received**: P_1081-u (25.09.18)R

---

**Schedule Quality**

- **Score**: 26 / 100
- **Interpretation**: The schedule quality is average and there is moderate likelihood of not achieving project completion on time.

**Schedule Risk Drivers**

- **Risk Drivers for Current Schedule**

**Schedule with Risk events**

- **Current Schedule Current State vs Risk events**

**Critical Path Analysis**

- **Critical Path Analysis**

---

**Fuse Schedule Index**

- **Fuse Schedule Index**: 26 / 100
- **Interpretation**: Average score as there are 13 activities with no enough breakdown and should typically be replaced with activities

---

**Schedule Risk Drivers**

- **Risk Drivers for Current Schedule**

---

**Fuse Schedule Index**

- **Fuse Schedule Index**: 26 / 100
- **Interpretation**: The schedule quality is average and there is moderate likelihood of not achieving project completion on time.

---

© 2019 Protiviti Member Firm for the Middle East Region

CONFIDENTIAL – This document is for your organization’s internal use only and should not be copied or distributed to any third party.
## COST MANAGEMENT REVIEWS

### OBJECTIVE

- Provide independent assurance on project cost to complete by analyzing project budget, actual spent, identifying areas of major cost overruns and balance cost to go.
- Assist Management for effective decision making and visibility on project profitability at all stages.

### Conventional

<table>
<thead>
<tr>
<th>PEOPLE</th>
<th>Process</th>
<th>Tech</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Auditors</td>
<td>Review limited to compliance and budget adequacy</td>
<td>No tools used</td>
<td>- Assurance to Management on the Project cost to complete and ensuring profitability.</td>
</tr>
</tbody>
</table>

### Challenges

- Difficult to give realistic assurance on project Cost Overrun & Variations, cost to complete;
- Inaccurate cash flow forecasts and factoring of risks in CTC calculations;
- Unstructured Data, Multiple file records;

### Efficient Way

- Industry & Functional Expert with Project Controls & Quantity Surveying skills
- Analyzing project budget, actual spent, identifying areas of major cost overruns and balance cost to go.
- Data Analytics Tools taking input from ERPs like SAP, Oracle

### BENEFITS

- Assurance to any external institutions and share holders interested with the project
- Provide better control over various project cost heads
## COST MANAGEMENT REVIEWS

<table>
<thead>
<tr>
<th>Initiate</th>
<th>Strategic</th>
<th>Operational</th>
<th>Compliance</th>
<th>Financial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Capital Management Plan</td>
<td>No cost estimate at concept stage</td>
<td>Non compliance to budgeting procedure.</td>
<td>Absence of budget and high level cost estimate reporting to management</td>
<td></td>
</tr>
<tr>
<td>Lack of financial stability assessment.</td>
<td>Incomplete design cost estimate</td>
<td>Feasibility cost and budget are inconsistent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of commercial feasibility</td>
<td>Non comprehensive cost Heads</td>
<td>Non adherence to standard estimation criteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of detailed design brief</td>
<td>Cost estimate not as per schedule and resource deployment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk of cost overrun due to frequent changes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Contingency as per quantitative risk assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design &amp; Plan</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ineffective contracting strategy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improper cost to complete estimate.</td>
<td>Non Compliance to regulations such as anti-bribery and anti-corruption laws.</td>
</tr>
<tr>
<td></td>
<td>Absence of pre tender estimate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of value engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non adherence to packaging strategy and estimate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate monitoring lead to depletion of contingency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improper cost to complete estimate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No proper budget monitoring and transfer process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of corrective action plan.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delusion of cost at completion.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procure</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Risk of project cost escalation and losses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non compliance to budget transfer policy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of Project cost reconciliation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non settlement of all invoices.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of commercial audit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non settlement of Warranties and guarantees.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delusion of cost at completion.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deliver</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non settlement of contracts as per contract</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non compliance to budget transfer policy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No proper budget monitoring and transfer process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of corrective action plan.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No periodic reporting of cost performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of Lesson learnt.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Handover</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non settlement of contracts as per contract</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No periodic reporting of cost performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absence of Lesson learnt.</td>
<td></td>
</tr>
</tbody>
</table>

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization’s internal use only and should not be copied or distributed to any third party.
COST MANAGEMENT REVIEWS

KEY OUTPUTS

<table>
<thead>
<tr>
<th>Division</th>
<th>Accepted Contract Value</th>
<th>Revised Contract Incl. Appr'd VOs, EOTs &amp; ESCs</th>
<th>Forecasted Contract Incl. Appr'd VOs, EOTs &amp; ESCs</th>
<th>Budget at Completion</th>
<th>Cumulative Actual Cost Incurred</th>
<th>Remaining Cost to Complete</th>
<th>Total Cost at Completion</th>
<th>Forecasted OH &amp; Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>2,825,000,000</td>
<td>2,709,780,348</td>
<td>2,917,157,526</td>
<td>2,893,498,111</td>
<td>1,274,535,749</td>
<td>2,877,575,264</td>
<td>2,877,575,264</td>
<td></td>
</tr>
<tr>
<td>Prelims</td>
<td>256,028,525</td>
<td>280,089,323</td>
<td>361,010,231</td>
<td>410,055,515</td>
<td>133,131,913</td>
<td>455,788,734</td>
<td>455,788,734</td>
<td></td>
</tr>
<tr>
<td>Site Construction</td>
<td>48,904,248</td>
<td>47,395,605</td>
<td>48,111,094</td>
<td>6,432,652</td>
<td>42,539,409</td>
<td>48,972,061</td>
<td>48,972,061</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>457,598,655</td>
<td>530,217,811</td>
<td>479,118,937</td>
<td>25,455,682</td>
<td>512,060,737</td>
<td>28,599,399</td>
<td>28,599,399</td>
<td></td>
</tr>
<tr>
<td>Masonry</td>
<td>5,718,210</td>
<td>24,515,110</td>
<td>24,497,978</td>
<td>11,225,199</td>
<td>22,748,484</td>
<td>2,123,329</td>
<td>2,123,329</td>
<td></td>
</tr>
<tr>
<td>Metals</td>
<td>24,575,636</td>
<td>24,602,518</td>
<td>22,748,484</td>
<td>11,225,199</td>
<td>2,123,329</td>
<td>2,123,329</td>
<td>2,123,329</td>
<td></td>
</tr>
<tr>
<td>Wood and Plastics</td>
<td>4,706,721</td>
<td>5,063,136</td>
<td>4,646,854</td>
<td>4,627,170</td>
<td>-</td>
<td>436,778</td>
<td>436,778</td>
<td></td>
</tr>
<tr>
<td>Thermal and Moisture Protection</td>
<td>38,353,105</td>
<td>38,163,247</td>
<td>34,703,615</td>
<td>36,112,757</td>
<td>2,050,490</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Doors and Windows</td>
<td>277,297,704</td>
<td>275,440,014</td>
<td>262,422,865</td>
<td>22,778,626</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,825,000,000</strong></td>
<td><strong>2,709,780,348</strong></td>
<td><strong>2,917,157,526</strong></td>
<td><strong>2,893,498,111</strong></td>
<td><strong>1,274,535,749</strong></td>
<td><strong>2,877,575,264</strong></td>
<td><strong>2,877,575,264</strong></td>
<td></td>
</tr>
</tbody>
</table>

CASH FLOW ANALYSIS

Cash Flow Analysis

<table>
<thead>
<tr>
<th>Cost Head</th>
<th>Budgeted Amount (AED)</th>
<th>Total Anticipated Cost (AED) (B)</th>
<th>Actual Cost Incurred(AED) (C)</th>
<th>Estimate to Complete (AED) (C/A-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:</td>
<td>CONSTRUCTION (Up to Package 8)</td>
<td>2,851,516,525</td>
<td>3,071,802,435</td>
<td>2,176,343,665</td>
</tr>
<tr>
<td>2:</td>
<td>CONSULTANCY</td>
<td>140,966,108</td>
<td>181,995,739</td>
<td>150,862,144</td>
</tr>
<tr>
<td>3:</td>
<td>AUTHORITIES</td>
<td>33,675,630</td>
<td>33,675,630</td>
<td>23,675,630</td>
</tr>
<tr>
<td>4:</td>
<td>DIRE STAFF EXPENSES</td>
<td>Not Available</td>
<td>22,030,000</td>
<td>18,000,000</td>
</tr>
<tr>
<td>5:</td>
<td>FINANCING COSTS</td>
<td>Not Available</td>
<td>643,491,683</td>
<td>437,100,534</td>
</tr>
<tr>
<td>6:</td>
<td>CONTINGENCIES</td>
<td>213,863,739</td>
<td>50,000,000</td>
<td>0</td>
</tr>
<tr>
<td>7:</td>
<td>VAT (over construction &amp; consultancy costs)</td>
<td>Not Considered</td>
<td>46,327,618</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,240,022,002</td>
<td>4,049,313,105</td>
<td>2,806,017,973</td>
<td>1,243,295,132</td>
</tr>
</tbody>
</table>

Project CTC Summary

Cash Flow Summary

Table 2 – Cash Flow Summary
## Contract and Claims Management Reviews

### Objective
- Identify potential cost recovery or cost optimization opportunities & Identify risk areas within the contract before leading to claims, variations, dispute/arbitration.
- Enable organizations to quickly identify greater value from their contractual arrangements (performance & compliance) and to sustain value across the contract lifecycle.

### Conventional
- General Auditors
- Review limited to compliance and
- No tools used

### Challenges
- Difficult to ascertain confidence on to-be Claim & Variations;
- Non identification of contract lapses;
- Not able to surface upon Contract performance issues;
- No focus on cost recovery;

### Efficient Way
- Industry & Functional Expert with Contract Management & Commercial skills
- Analyzing contracts, payments & commercial areas
- Optical Character Recognition Tool

### Benefits
- Assurance on the adequacy of controls over the contract performance & compliance during execution
- Independent review to attain savings in areas of variations, payment certification, final account settlement etc.
CONTRACT AND CLAIMS MANAGEMENT REVIEWS

KEY OUTPUTS

Typical Areas of Contractual Overpayments

- Mismatch in Bill of Quantities claimed vs. agreed within Baseline
- Consistency with BOQ Rates
- Advance Payments, Retention, Deductions (NCR’s / Non-Performance)
- Interim Payments, Material On-Site Payments
- Provisional Sum Items
- Free Issue Materials
- Performance Bank Guarantees
- Claim / Variations
- Liability

Financial Leakage
## OPERATIONAL READINESS, ASSET & FACILITY MANAGEMENT REVIEWS

### OBJECTIVE
- Identify and manage project handover issues and mitigating risks to ensure safe & timely start-up for revenue generation including effective Operational Readiness monitoring & tracking;
- Identify potential reduction in asset maintenance costs;

### Conventional
- General Auditors
- Review limited to FM contracts compliance
- No tools used

### Challenges
- Inability to determine core operational issues;
- Review not focused on contract performance & FM cost reduction;
- Not able to surface upon Contract performance issues;

### Efficient Way
- Industry & Functional Expert with operation and maintenance skills
- Performance driven approach for analyzing the FM, AM, PPM, Hanover, Close-out areas
- Drones, BMS, DA Applications and IOT devices

### BENEFITS
- Efficient Energy Cost Monitoring & Reduction
- Reduction in the maintenance expenses
- Timely Start-up
- Efficient Spare Management
- Identification of hotspots which might lead to accident.

### PEOPLE
- General Auditors

### PROCESS
- Review limited to FM contracts compliance
- No tools used

### TECH
- Efficient Energy Cost Monitoring & Reduction
- Reduction in the maintenance expenses
- Timely Start-up

### BENEFITS
- Efficient Spare Management
- Identification of hotspots which might lead to accident.
OPERATIONAL READINESS, ASSET & FACILITY MANAGEMENT REVIEWS

KEY OUTPUTS

Drone Captures Defects in Assets and Poor workmanship

IOT based Building Facility Management
ADOPTING COMPREHENSIVE AND PROACTIVE APPROACH
IDENTIFYING AUDIT AREAS ACROSS PROJECT VALUE CHAIN TO GAIN SYNERGIES

Initiate

- Market Study
- Design brief
- Financial Feasibility
- Technical Feasibility
- Procurement Strategy

Plan

- Project Baseline Plan
- Procurement Plan
- Resource Deployment
- Procurement plan

Audit Areas

- Feasibility Audit
- Estimation Audit
- Governance, Design, Schedule & Cost Audits
- Procurement & tendering Audit
- Project Mgmt., QHSE, Constr., Contract & Payment Audit
- Handover, Close-out, FM Audits

Build

- Design finalization
- Scheme design
- Detailed engineering
- Tender documentation
- Estimation & Tendering
- Advanced works procurement
- General works procurement

Operate

- Construction
- Materials
- QHSE
- Finishing works
- Assembly and commissioning
- Start up
- Operations
- Maintenance
- Documentation

Operation and Maintenance

- Operation & Maintenance

Activities

- Project Conceptualization & Initiation
- Planning
- Engineering
- Procurement
- Construction

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization's internal use only and should not be copied or distributed to any third party.
ADOPTING HORIZONTAL & VERTICAL APPROACH ALIGNED TO AUDIT OBJECTIVES

**Horizontal Approach**

- Tendering & Estimation
- Project Management
- Schedule Management
- Cost Management
- Project-1
- Project-2

**Vertical Approach**

- Project Review - 1
- Project Review - 1
- Project Review - 1
- Project Review - 1

- Focus is on process and coverage

- Focus is on project objectives such as timely completion of project & within cost including any cost recovery opportunity
ADOPTING HORIZONTAL & VERTICAL APPROACH ALIGNED TO AUDIT OBJECTIVES

<table>
<thead>
<tr>
<th>Cost Reporting</th>
<th>Schedule Reporting</th>
<th>Risk Reporting</th>
<th>Procurement Management</th>
<th>Project Controls, Quality and Environmental, Safety &amp; Security Reporting</th>
<th>Quality Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Integration Management</td>
<td>Reporting &amp; Stakeholder Management</td>
<td>Human Resources &amp; Labor Relations</td>
<td>Cost and Financial Management</td>
<td>Financial Management</td>
<td>Procurement Management</td>
</tr>
<tr>
<td>Roles &amp; Responsibilities</td>
<td>Recurring, Hiring &amp; Retention Update</td>
<td>Funding Revision</td>
<td>Financial Management</td>
<td>Asset Categorization</td>
<td>Prime Contracting</td>
</tr>
<tr>
<td>Lessons Learned</td>
<td>Relations &amp; Industrial Action</td>
<td>Contingency Management</td>
<td>Progress &amp; Other Payments</td>
<td>Asset Register</td>
<td>Contracting &amp; Purchasing</td>
</tr>
<tr>
<td>Project Breakdown Structure</td>
<td>Training &amp; Development of Resources</td>
<td>Cost Management</td>
<td>Cost Management</td>
<td>Asset Transfer</td>
<td>Contracting Administration</td>
</tr>
</tbody>
</table>

Project-1 (Residential Tower)

Project-2 (Power Sub Station)
<table>
<thead>
<tr>
<th>Key Skills</th>
<th>Review Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Project Management / Project Controls</td>
<td>Project Reviews, Schedule Delay &amp; Forensics Analysis, Cost To Complete Reviews, PMO, Enterprise &amp; Project Risk Management, Profitability &amp; Cash Flow Analysis, QHSE &amp; EHS reviews, Material Balancing, Productivity Analysis</td>
</tr>
<tr>
<td>4 Supply Chain</td>
<td>Procurement Review , Logistics Review</td>
</tr>
<tr>
<td>5 Finance &amp; Accounting</td>
<td>Cost Accounting, Capital expenditure reviews , Revenue Assurance</td>
</tr>
</tbody>
</table>
USE OF STANDARD FRAMEWORK, METHODOLOGIES & TEMPLATES TO OPTIMIZE AUDIT TIMELINE

Schedule Review

Project Review Framework

Cost Review

Feasibility Review

Risk Management

The construction baseline schedule will be cleaned by performing the following:

- Removing unnecessary (tedious) tasks
- Removing all negative float (days from the schedule)
- Eliminating the repetition of similar activities or consulting them into the structure

The cleansed schedule version will provide a more realistic completion date with a higher probability of success.

Schedule Review

Project Review Framework

Cost Review

Feasibility Review

Risk Management

- Prepare a change request
- Schedule management
- Quality assurance
- Commercial & Contracts review

Cost Review

Feasibility Review

- Estimate high-level costs based on historical data and industry benchmarks
- Identify critical success factors and potential risks
- Conduct sensitivity analysis to understand the impact of changes in key variables

Commercial & Contracts Review

- Analyze contracts and identify potential issues
- Develop strategies to mitigate risks and maximize opportunities
- Ensure compliance with legal and regulatory requirements

The results: an accurate cost risk forecast that fully accounts for schedule risk exposure where relevant.

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization's internal use only and should not be copied or distributed to any third party.
# ADOPTING AN OUTCOME DRIVEN APPROACH

<table>
<thead>
<tr>
<th>Scope Areas</th>
<th>Focus Areas</th>
<th>Key Outcomes</th>
</tr>
</thead>
</table>
| **Project Feasibility Review & Design** | • Review Project Feasibility & Associated Financial Model  
• Review ROI, ROCE and Payback Period, Milestone  
• Assessment of Value Engineering performed  
• Review of scope and Design Requirement  
• Review of value engineering process  
• Site Visits / Inspections | • Impact on Key feasibility KPI’s (cash flow, IRR, NPV, etc.)  
• Compliance to Design Requirement – BOQ  
• Compliance to Material delivery quality  
• View on Physical progress  
• Compliance to value engineering process |
| **Schedule Performance Review** | • Review of Project timelines  
• Validate robustness of project’s planning methodology  
• Review the changes to project timelines  
• Identification of Delays and its impact on overall schedule  
• Conducting manpower productivity analysis | • Schedule Performance (Engineering Delays, Procurement, Manufacturing & Delivery Delays, work front / production delays, etc.)  
• Schedule quality analysis  
• Critical path analysis  
• Assurance on planned project completion |
| **Cost Review**                  | • Review Project Budget (Accuracy)  
• Identify Budget Variance & Root Cause Analysis  
• Cost to Complete & Cash Flow Analysis  
• Compliance to Construction & Design, Safety guidelines | • Adequacy & Adherence of Project Budget  
• Assurance on forecasted CTC and view on cost over-run |
| **Project Reporting & Risk Assessment** | • Evaluate the project measurement reporting system  
• Qualitative & Quantitative Risk Assessment using Monte-Carlo Simulation | • Completeness, accuracy and validity of progress and management reporting  
• Assurance on potential Risk, opportunity & contingencies  
• Schedule Risk Analysis |
USE OF TOOLS TO COVER WIDER SAMPLES & GAIN EFFICIENCY

**Project Due Diligence**

**Process Mining**

**Drone Visualization**

**Deltek Schedule Analyzer**

**Monte Carlo Risk Analysis Tool**

**Primavera Tool**
USE OF TECHNIQUES FOR PERFORMANCE ANALYSIS

Duration Sensitivity Analysis

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.01 - Unfilled labor</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>2.03 - Environmental Clearance</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>3.02 - Decommissioning</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>3.07 - Mobilization of material</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>1.03 - Float exchange &amp; load out</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>2.04 - LC cost</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>1.02 - Project schedule</td>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>

Budget analysis & forecast cost at completion

![Illustrative chart showing budget analysis and forecast cost at completion.]

Critical Path and Delay Analysis

![Illustrative chart showing critical path and delay analysis.]

Cash flow historical performance and forecast

![Illustrative chart showing cash flow historical performance and forecast.]

Project different delay analysis techniques

![Illustrative chart showing project different delay analysis techniques.]

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization’s internal use only and should not be copied or distributed to any third party.
LEVERAGING PROJECT DATABASE, BENCHMARKS & INDUSTRY BEST PRACTICES TO INNOVATE & ADD VALUE

Project Lifecycle Risk Library

PMP Best Practices

PMP Risk Model

Industry Leading Practice & Benchmarks

Project Controls Library

Processes

Owner's Risk

Owner's Controls

- Project Controls
- Project Management

- Schedule & Resource Management
- Estimation
- Procurement
- Risk Management

- Project Lifecycle Risk Library
- Benchmark Research & Industry Best Practices
- Project Controls Library
- PMP Risk Model

© 2019 Protiviti Member Firm for the Middle East Region
CONFIDENTIAL – This document is for your organization's internal use only and should not be copied or distributed to any third party.
DISRUPTION IN FUTURE CAPITAL PROJECTS
EMERGING TECHNOLOGIES IN CAPITAL PROJECTS

Risks

- Inability to source the right data
- Lack of assurance mechanisms
- Exposure to cyber risks
- Difficulty in filtering relevant information from vast amount of data generated
- Lack of regulations
EMERGING TECHNOLOGIES IN CAPITAL PROJECTS

Artificial Intelligence reads BIM Model

Allocates works to 3D Printing & Robots

3D Printing in Construction

Robotics in Construction

Instruction to Rovers & Drones to monitor Quality, Progress and Safety Violation

Updates Project Management Information systems (PMIS)

Information stored in Cloud

Monitoring Quality

Monitoring Progress

Monitoring Safety

BIM Model
FUTURE OF CAPITAL PROJECTS AUDITING?

DATA, CAN YOU HELP ME?

BUSINESS INTELLIGENCE?

Auditing Disruptive Technologies?

Continuous Risk Assessment?

Virtual Auditor?

Say good-bye to rotational audit plans!

Data driven Decision Making?
Face the Future with Confidence

Contact Us;
Varun Kharbanda, Director – Real Estate, infrastructure & Capital Projects
Email - Varun.Kharbanda@protivitiglobal.me
Mobile - +971-565099207