Expert evaluation of project opportunities in oil & gas projects: transforming a literature review into project priorities

Nikolaos Boukas, **Konstantinos Kirytopoulos**
Metrotechnics Lab, School of Mechanical Engineering
National Technical University of Athens

CITC-15 | November 10 - 14, 2025
Hosted by The International University of Rabat
Rabat, Morocco

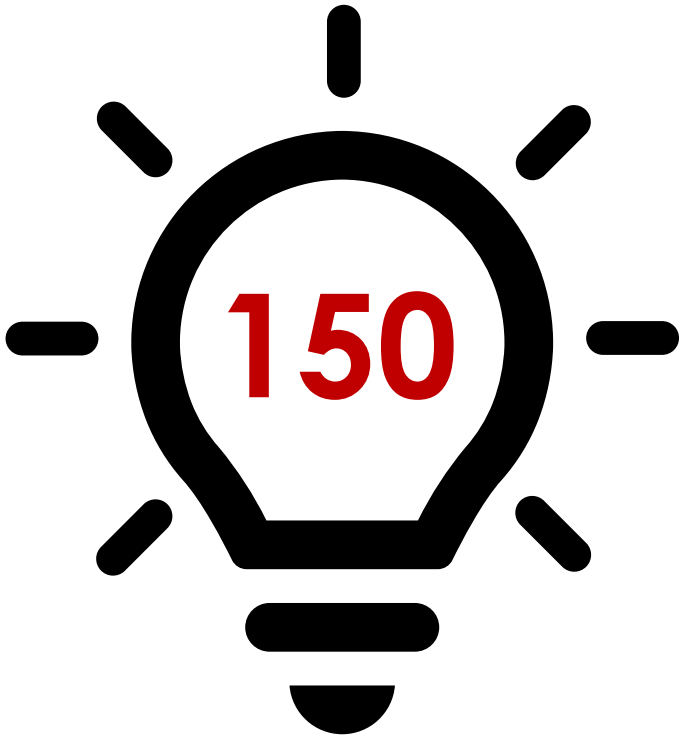
CITC GLOBAL
Construction in the 21st Century

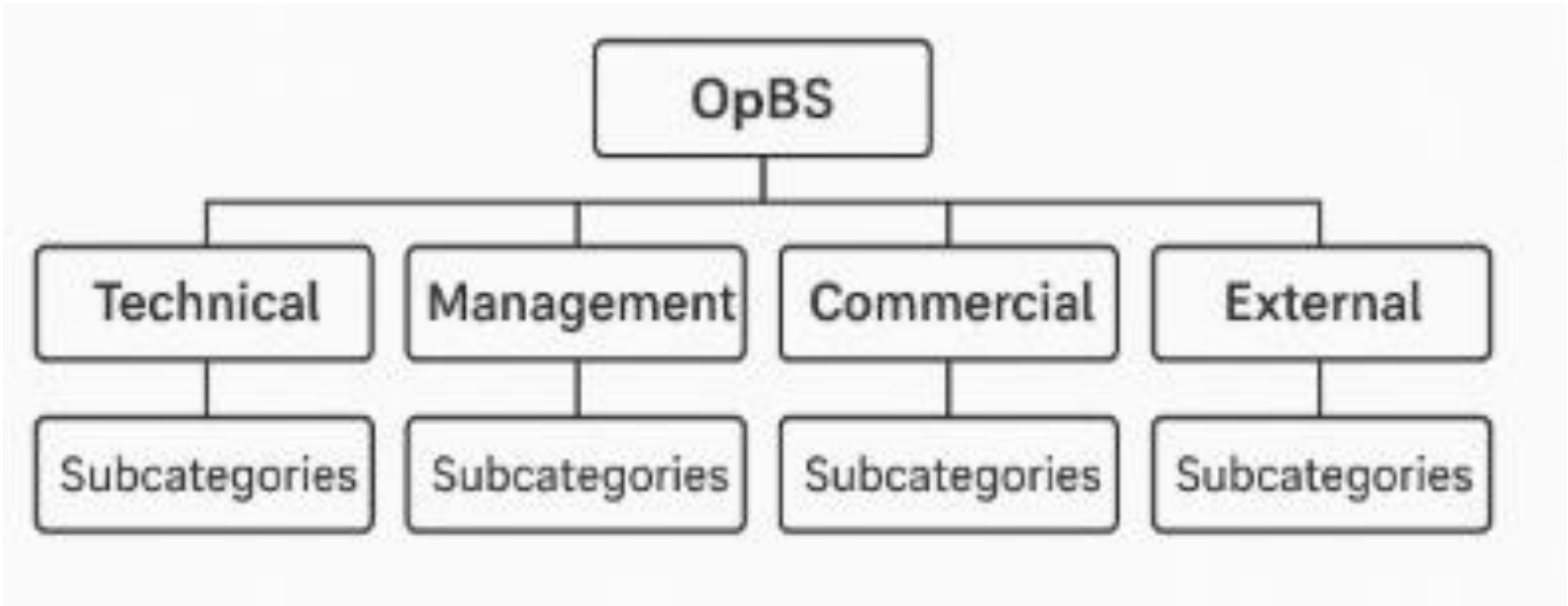
Introduction & Background

Framework

- Risk management tends to focus on threats, leaving opportunities under-managed.
- Several studies confirmed that this imbalance persists to the present.
- Opportunity management is crucial for oil & gas industry projects to enhance project value & efficiency.

Introduction & Background





METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Aim, Objectives, and Scope

The Problem

- Identify a set of significant project opportunities in oil & gas industry projects.

Scope

- Expert evaluation of the 150 literature-derived project opportunities.

Objectives

- Validate the develop OpBS.
- Capture real-world consensus on identified opportunities.
- Provide an actionable set of significant project opportunities.

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Research Design and Methodology

Data collection - Experts Panel

- Expert interviews to select the significant ones from 150 opportunities.
- Balanced managerial and technical roles, from all oil & gas sectors with international exposure
- New opportunities proposed by experts

17 Experts
(Jan–Jul 2025)

10 / 7
Experts
Managerial / Technical

19 yrs
Avg. experience (10–40)

16 / 12 / 2
Experts
Down / Mid / Upstream

100%
International exposure

9 / 6 / 2 Experts
Contractor / Owner / Consultant

METRO TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Research Design and Methodology

Data extraction

- 50% threshold for significant project opportunities
- Subgroup analysis performed to identify significant opportunities within experts' subgroups
- Unique selections reached 138 out of 150 opportunities by 11th interview; only 3 new opportunities thereafter → data saturation achieved.
- Interviews continued to refine prioritization and experts panel diversity

METR TECHNICS LAB

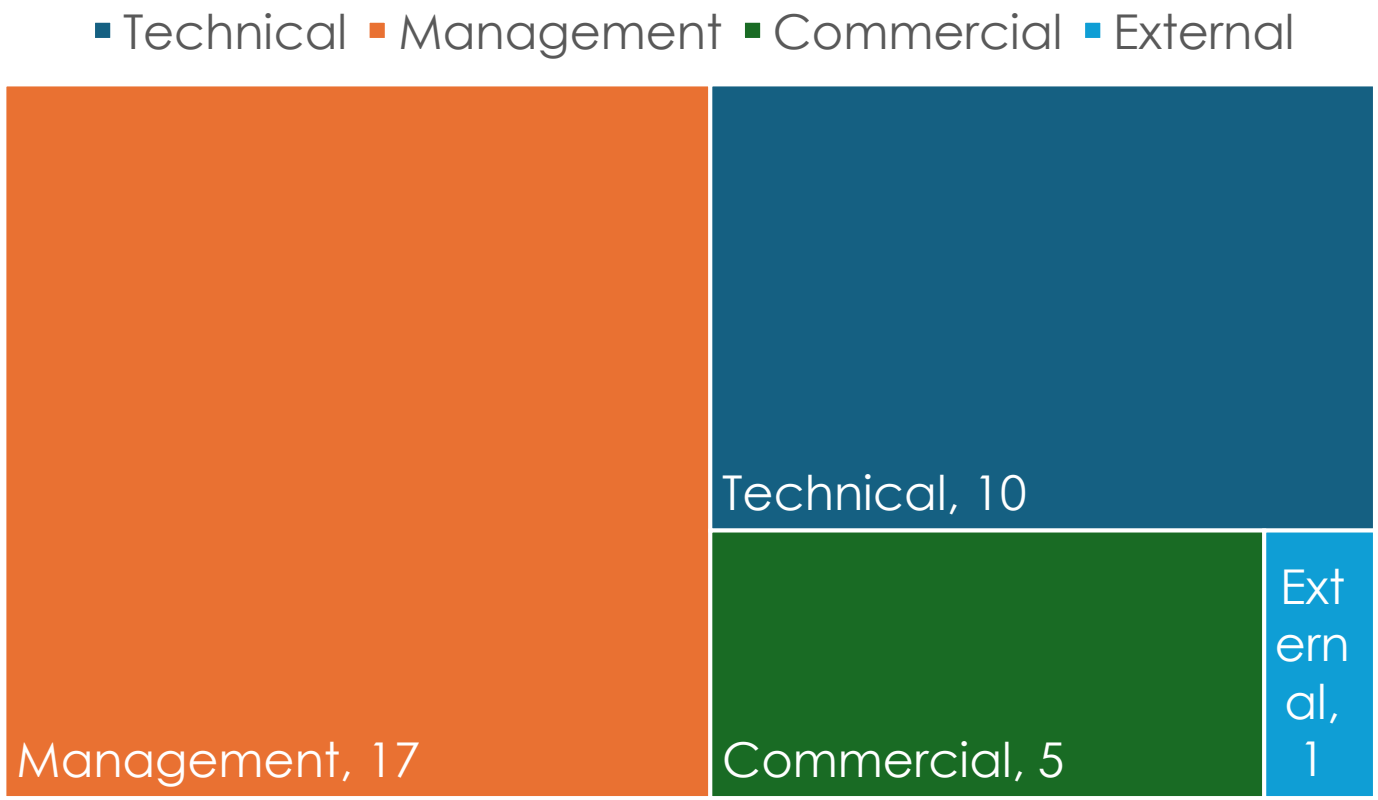
CITC GLOBAL
Construction in the 21st Century

Results

141 opportunities
Unique selections marked significant

24 opportunities
>=50% consensus

33
Significant opportunities (24 + 9 subgroup)



Significant Opportunities distribution across Level 1 categories

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Results

Level 1 categories consensus level

Technical

High: 4 (10%)

Low: 24 (56%)

Management

Medium: 24 (33%)

Commercial

Low/Non-selected: 18 (64%)

External

No High

>50% Low/Non-selected

Low: <30% of experts · Medium: 30–60% · High: >60%.

METR TECHNICS LAB

CITC GLOBAL Construction in the 21st Century

Results

Technical Level 1 category drill-down

Design Improvements	Digital Transformation	**Engineering & Construction Practices**
Specifications Optimization	Sustainability	Technological Innovation

Expanded: Engineering & Construction Practices

High consensus

Use of modularization *(Top-5)*

Extending the use of 3D models for detailed construction studies and planning

Medium consensus

Transition from site-cast production to prefabrication construction methods

Selection of appropriate construction methods

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Results

Level 2 sub-categories deep dive

Project Planning & Execution

Most substantial area;
consensus concentrated in Medium with notable High items

- Planning of procurement of long-lead items (High)
- Involving subcontractors early in planning and design phases (High)

Medium cluster | Some High | Many Low

Targeted Highs

Specific Level-2 subcategories that include at least one High opportunity

- Specifications Optimization — Standardization of specs (High)
- Technology Innovation — Applying alternative technologies (High)
- Suppliers & Vendors — Broader vendor list (High)

High exists

Medium Consensus Clusters

Subcategories with many Medium opportunities

- Design Improvements
  - Employ constructability analysis early in the project phases
  - Use of standardized design elements
- Contractual Approaches
  - Setting clear and specific contractual requirements

Low Consensus Clusters

Subcategories with many Low/Non-selected opportunities;
context-specific relevance

- Digital Transformation
- Project Management
- Partnerships
- Resourcing

METRO TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Results

High consensus opportunities

Opportunities	Votes (n/17)
Standardization of project specifications for major topside equipment and bulk materials	**14/17**
Planning of procurement of long-lead items	**13/17**
Applying technical innovation or alternative technologies	**12/17**
Involving subcontractors early in planning and design phases	**12/17**
Use of modularization	**12/17**

METRO TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Discussions, Conclusions & Recommendations

- Expert interviews were appropriate; saturation achieved; subgroup analysis adds nuance beyond a single threshold.
- High consensus items align with cost/schedule performance:
  - standardization, long-lead items procurement planning, modularization, subcontractor involvement.
- Lower-consensus items (often Commercial/External or novel/digital) require context-specific tailoring.
- 6 new project opportunities such as digital twin use, early permitting planning, and improved team coordination proposed by the experts

Discussions, Conclusions & Recommendations

- From 150 literature-derived opportunities, experts selected 33 significant items for oil & gas projects.
- A pool of significant project opportunities was developed to serve as a practical road-map for oil & gas projects key stakeholders to focus their efforts and resources.
- Next step: Broader survey to collect quantitative data on the perceived importance of each opportunity.

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Questions & Answers

Nicolaos Boukas **Dr Konstantinos Kirytopoulos**

National Technical University of Athens
School of Mechanical Engineering
Sector of Industrial Management and Operational Research

Contact

http://kkir.simor.ntua.gr

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

Back-up slides

Pool of Significant project Opportunities

- **Technical**
  - Design Improvements:
    - *Optimizing technical and technological solutions for design and materials*
    - *Employ constructability analysis early in the project phases*
    - *Use of standardized design elements*
  - Engineering/ construction practices:
    - *Extending the use of 3D models for detailed construction studies and planning*
    - *Transition from site-cast production to prefabrication construction methods*
    - *Use of modularization*
    - *Selection of appropriate construction methods*

Pool of Significant project Opportunities

- **Technical (continued)**
  - Specifications Optimization:
    - *Standardization of project specifications for major topside equipment and bulk materials*
    - *Optimizing project specifications of equipment and materials*
    - *Applying technical innovation or alternative technologies*
- **Management**
  - Project Planning and Execution:
    - *Involving subcontractors early in planning and design phases*
    - *Enhancing subcontractors' engagement in innovative projects to contribute their own ideas and technologies*
    - *Executing Front-End Loading (FEL) for business opportunity identification and risk mitigation*

Pool of Significant project Opportunities

- **Management (continued)**
  - Project Planning and Execution (continued):
    - *Initiating early engineering activities prior to Engineering, Procurement and Construction (EPC) contract signing*
    - *Applying value-improving practices in the early stages of a project*
    - *Using two shifts during construction for critical activities*
    - *Early involvement of operations and maintenance personnel early in the design review process*
    - *Planning of procurement of long-lead items*
    - *Timely selection and awarding of contracts to subcontractors*
    - *Focusing procurement decisions on construction needs and priorities*

Pool of Significant project Opportunities

- **Management (continued)**
  - Knowledge Management:
    - *Creating comprehensive lessons learned reports*
  - Procedures and Documentation:
    - *Promoting Inspection and Test Plans (ITPs) as primary project roadmaps*
    - *Implementing a formal document and change control process to manage modifications*
  - Communication
    - *Provision of sufficient information to project team members to clearly define project scope, outline owner/contractor responsibilities, and address the owner's risks and needs*
    - *Establish clear communication channels between the design team, client, and other project members*

Pool of Significant project Opportunities

- **Management (continued)**
  - Organization:
    - *Creating an efficient team*
  - Project management
    - *Establishing a fully integrated team throughout all project phases (design, construction, commissioning, etc.)*
- **Commercial**
  - Contractual approaches
    - *Adopting alternative contractual approaches (Engineering, Procurement and Construction Management EPCm, EPC with procurement on a reimbursable basis and construction on an actual man-hours basis, Engineering & Procurement by the owner with separate engagement of a construction contractor) vs traditional EPC methods*
    - Reducing risk and price disparities during tender negotiations with subcontractors
    - Setting clear and specific contractual requirements

Pool of Significant project Opportunities

- **Commercial (continued)**
  - Partnerships:
    - *Creating an efficient team*
  - Suppliers and Vendors
    - *Expanding the project vendor list to include more competitive vendors*
- **External**
  - Competition
    - *Entering new markets*

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century

New opportunities suggested by experts

- **Technical**
  - *Consideration of operational emergencies in project design and execution*
  - *Use of digital twin during project execution*
- **Management**
  - *Early and thorough consideration of permitting and authorization requirements*
  - *Ensuring that personnel who sign project deliverables and documentation have actively and thoroughly reviewed them before approval*
  - *Regular project meetings and information sharing to improve coordination across project sections*
  - *Clear definition and communication of roles to all team members*

METR TECHNICS LAB

CITC GLOBAL
Construction in the 21st Century