Mining companies have returned more money to shareholders over the last several years than companies in any other industry. Commodity prices have been pointing upwards since mid-2009. These are great times to be in this industry. However, the cyclical nature of this industry is only too well known. Just when it appeared that the recession was behind us, doubts are being cast on such conclusions.

This is one industry where every few years we need to switch operating philosophy and style. Some companies have mastered the art of staying ahead of the commodity cycle by modulating their operational response admirably. Several others however falter at tempering their way of working in line with the business environment. This inertia leads to either missed opportunities or over-reaction. We have observed that mere focus on operations control does not prepare the company to meet the new situation around the corner. There is always something novel about change that throws the earlier formula out of gear. The best solution seems to be to create an operational discipline and reaction capability in the organizational systems and culture that allow it to flex in the desired manner and to the desired degree.

We have developed our operational excellence framework over the last several years of association with leading mining companies. It starts off an organization on a journey of efficiency and then over time embeds such characteristics in its organization that makes the change sustainable over business cycles. This puts together all the capabilities necessary to assure the CEO that “operation” will be able to adapt to support their hunt for the next opportunity, whatever its nature.
Typical operational issues faced by resources companies

In context of these challenges, KPMG identified certain parameters of the mining process architecture, which should be revisited and operational parameters and KPI’s to be benchmarked to address operational issues and maximize value and minimize risk.

### Impact on mining process architecture

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Vision &amp; mission setting</td>
<td>Detailed exploration &amp; survey</td>
<td>Legal/ regulatory/ environment management</td>
<td>Production planning (incl. geological consideration)</td>
<td>Production planning</td>
<td>Asset strategy (lease/own, etc.)</td>
<td>Customer &amp; market strategy (incl. pricing &amp; service strategy)</td>
<td>Finance, accounts, risks &amp; control</td>
</tr>
<tr>
<td>Market &amp; business environment assessment</td>
<td>LoM &amp; reserve strategy</td>
<td>Land acquisition</td>
<td>Resource &amp; asset roster deployment/ fleet mgt</td>
<td>Input material/ stockpile management</td>
<td>OEE management</td>
<td>Customer contracting and order management</td>
<td>Human resource (incl. ongoing manpower planning)</td>
</tr>
<tr>
<td>Product portfolio planning</td>
<td>Geological modelling</td>
<td>MDO contracting &amp; equipment procurement</td>
<td>Mine to mill integration (bottleneck &amp; stockpile mgt)</td>
<td>Bottleneck management</td>
<td>Maintenance planning &amp; scheduling</td>
<td>Customer relationship management</td>
<td>Town &amp; general administration</td>
</tr>
<tr>
<td>Stakeholder management</td>
<td>Progressive development planning</td>
<td>Infrastructure construction (incl. evacuation infra)</td>
<td>Execution – D&amp;B, R&amp;C, L&amp;H, back-fill, etc.</td>
<td>Execution – crushing, beneficiation, waste handling</td>
<td>Maintenance execution</td>
<td>Inventory management</td>
<td>Ongoing sourcing &amp; procurement</td>
</tr>
<tr>
<td>Corporate strategy development, implementation &amp; monitoring</td>
<td>Process design &amp; evacuation planning</td>
<td>Rehabilitation &amp; resettlement</td>
<td>Mine to crusher integration incl. bottleneck &amp; stockpile mgt</td>
<td>Partner/ contractor operations management</td>
<td>Asset condition monitoring replacement or Life extension</td>
<td>Logistics planning &amp; scheduling</td>
<td>Information technology management</td>
</tr>
<tr>
<td>Resource planning (capital, equipment &amp; manpower)</td>
<td>Box-cut or initial drilling etc.</td>
<td>Partner/ contractor operations management</td>
<td>Quality management</td>
<td>Spare management</td>
<td>Partner relationship management</td>
<td>Health, safety &amp; environment</td>
<td></td>
</tr>
<tr>
<td>Financial feasibility</td>
<td>Project monitoring</td>
<td>Quality management</td>
<td>Technical/ engineering services</td>
<td>Maintenance network/ infrastructure management</td>
<td>Transport infrastructure maintenance</td>
<td>Ongoing corporate social responsibility</td>
<td></td>
</tr>
<tr>
<td>Operational/ annual planning</td>
<td>Recruitment &amp; deployment</td>
<td>Technical/ engineering services</td>
<td></td>
<td></td>
<td>Transport execution (rail, jetty, port operation)</td>
<td>Research &amp; development/ product development</td>
<td></td>
</tr>
</tbody>
</table>

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KPMG’s Operational Excellence Framework helps mining / resource companies gain a strong position in markets, become industry leaders by EBITDA, retain a leading position in margins and return on investments through high levels of operations integration across functional verticals and cost competitiveness.

### Typical operational issues faced by mining companies

<table>
<thead>
<tr>
<th>Retaining cost leadership</th>
<th>Increase in cost of operation due to escalation in raw material cost (e.g., explosive cost, electric power, etc.). Certain costs of operations such as wages, utilities, construction and maintenance costs are quite sensitive to possible general price increases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensuring investment effectiveness</td>
<td>High capital expenditures with focus on the modernization of mining facilities.</td>
</tr>
<tr>
<td>Managing operational flexibility/integration</td>
<td>Multiple entities and mine operations need appropriate level of integration and operational flexibility implemented to manage cyclic nature of commodity industry.</td>
</tr>
<tr>
<td>Driving value through carbon optimization</td>
<td>Entities need to evaluate the impact of pricing and regulation of carbon emissions on financial performance in order to optimize operational and technology investment decisions.</td>
</tr>
</tbody>
</table>

### KPMG’s approach towards operational excellence in mining

1. **Opportunity Diagnostic**
   - Identify improvement opportunities through analytics and good practice/benchmark comparison

2. **Benefit Measurement & Business Case**
   - Quantify opportunity value and evaluate the case for investing in it

3. **Implementation Program Design**
   - Define focus area, nature of intervention, tools, implementation organization etc.

4. **Implementation Roll-out**
   - Execute implementation plan by training people, instituting systems and processes to enable continuous improvement or business excellence
   - Gradual enablement of client company accompanied by roll-back of KPMG deployment

5. **Program & Change Management**
   - Oversee diagnostic, design and implementation phase by ensuring timelines, outcome, monitoring progress, tracking benefits and assessing ability of organization to manage the process on its own
   - Institute relevant change management and change communication framework to ensure program success

6. **Performance Culture Reinforcement**
   - Culture Diagnostic through surveys to assess uniformity, clarity, value systems, beliefs, etc.
   - Determination of cultural traits to be reinforced based on workshops with senior management such that they are in line with program focus
   - Design & Roll-out of Culture Reinforcement initiatives for achievement of desired traits
Opportunity Diagnostic

Analyze the cost base of production facilities to identify the cost optimization opportunities across value chain through analytics and good practice/benchmark comparison

a. Analyze the major cost and spend categories, identify cost drivers

b. Identify performance issues for each process (and related drivers) and analyze root cause.

Benchmarking
- Analyze and compare performance in the focus areas
- Identify potential areas of improvement and KPI to be benchmarked.

Operations Excellence Maturity Analysis
- Understand management’s perception of maturity of the process in the previous step based on a Operations Excellence Maturity Analysis.

Hypotheses Definition
- Define the hypotheses on potential cost improvement opportunities.

Cost baseline developed and mapped to the commercial process architecture
- Identify and compute the relevant KPIs and perform benchmarking

Objectives
- Identify “pain point” and/or wider area of focus and establish findings
- Identify CSF’s, Enablers, best practice (internal and/or external).

Tasks
- Conduct management interviews
- Questionnaire administration
- Plan preliminary site-visits to understand organization maturity.

Outputs
- Identify areas of improvement
- List processes that could impact the KPIs and which need improvement.
- Consensus on which of the processes identified in previous step can be impacted
- KPIs improvement targets.

Deliverables – Red Flag Report
- A set of hypotheses on potential opportunities
- Range of cost optimization potential for the different hypotheses.

Diagnostics tools and templates
- Cost base analysis
- KPI analysis
- Benchmarking
- RCA – Issue tree
- Value chain analysis
- Operating philosophy.

Red Flag Report
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2 Benefit Measurement & Business Case

Delve deeper into the preliminary analysis, build consensus on the cost savings potential and the actions required to achieve them

a. Validate solution themes through analysis of further secondary/primary information

b. Identify and agree with client the process, people/skill, organization and system change required to realize the envisaged benefit

c. Evaluate each action to estimate rough cash inflow impact, Capex and Opex requirement.

<table>
<thead>
<tr>
<th>Design/ Solution Deep Dive</th>
<th>Change Levers</th>
<th>Business Case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td><strong>Tasks</strong></td>
<td><strong>Tasks</strong></td>
</tr>
<tr>
<td>Study of inputs and outputs, focusing on KPIs to drive internal and external comparison</td>
<td>Identify and agree with client the process, people/skill, organization and system change required to realize the envisaged benefit</td>
<td>Agree with client the improvement opportunities, high level solution themes, cost of changes and the annualized benefit.</td>
</tr>
<tr>
<td>Identify constraints of specific sites through detailed discussions.</td>
<td>Determine key success factors.</td>
<td>Evaluate each action to estimate rough cash inflow impact, Capex and Opex requirement.</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td><strong>Outputs</strong></td>
<td><strong>Outputs</strong></td>
</tr>
<tr>
<td>Expert Interviews</td>
<td>Improved change case for organization structure, systems, operating model, processes and technology to achieve the targeted level of performance and the cost savings.</td>
<td>Estimation of the cost of implementing the change</td>
</tr>
<tr>
<td>Second level data analysis.</td>
<td>Business Case for Change</td>
<td></td>
</tr>
</tbody>
</table>

Benefit Measurement tools and templates

- Organizational design
- Network modelling
- Trade off analysis

Deliverable – Business Case for Change

- Operating model
- Current state analysis.
Conduct in-depth discussions with the senior management team to agree and finalize the implementation plan, program structure and accountability framework.

a. Interview department heads and above to assess willingness and capability of people to take ownership of the change.

b. Develop detailed implementation plan.

**Implementation Program Design**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Implementation Planning</th>
<th>Base and Evaluation of KPI’s for benefit tracking mechanism design</th>
<th>Implementation governance structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost savings potentials</td>
<td>• Allocation of required resources and/or budgets</td>
<td>• Ensure clarity around key measures to track program benefits</td>
<td>• Define clear roles and responsibilities of team including the role of the PMO</td>
</tr>
<tr>
<td>Processes to be considered for achieving targets</td>
<td>• Identify key milestones required to deliver change outcomes.</td>
<td>• Identify and develop a clear evaluation methodology and program dashboard.</td>
<td>• Clarity on the key governance meetings.</td>
</tr>
<tr>
<td>Estimate of costs to achieve the targets</td>
<td>• Identification and development of key activities to achieve the milestones</td>
<td>• Agreement on the phasing of the identified potential benefits.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Plan organized by key work stream.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>• Overall program structure.</td>
<td>• Methodology for capturing key data on a regular basis, base performance level and signing off the benefits.</td>
<td>• Effective program governance structure.</td>
</tr>
</tbody>
</table>

**Implementation Program Design tools and templates**

- Risk analysis
- RACI model
- Benefits delivery.
4 Implementation Roll-out

- Managed Delivery
- Assisted Delivery
- Independent Delivery
- Execute implementation plan by training people, instituting systems and processes to enable continuous improvement or business excellence
- Gradual enablement of client company accompanied by roll-back of KPMG deployment.

We prioritize actions based on the findings
5 Program & Change Management

- Oversee diagnostic and implementation phase by ensuring timelines, outcome, monitoring progress, tracking benefits and assessing ability of organization to manage the process on its own.
- Institute relevant change management and change communication framework to ensure program success.

6 Performance Culture Reinforcement

- Culture diagnostic through surveys to assess uniformity, clarity, value systems, beliefs, etc.
- Determination of cultural traits to be reinforced based on workshops with senior management such that they are in line with program focus.
Case Studies
Operational Excellence

Client: PTTI – SAR (Thailand, Indonesia, Singapore)

Challenge: The client engaged KPMG to assist in assessing the operational performance of the two mining assets

Approach: A detailed assessment of key business processes was performed using KPMG’s “Mining Business Process Improvement Methodology”

Developed solutions in the area of contract management, maintenance strategy, shipping efficiency, Mine planning and marketing contracts.

Identified “Red Flag” in the processes and analyzed root cause; agreed with the management through structured workshops on the improvement areas.

Client: Homeland Mining & Energy (South Africa)

Challenge: KPMG was engaged to carry out a comprehensive review of the operations of a coal mine and implement the recommendations

Approach: KPMG first completed the diagnostic and were then retained for a year-long implementation focused on:

- OEE improvement of key equipments utilized by contractors
- Re-negotiating contracts, new organization structure deployment, performance management system implementation and upgrading the management information system.

Client: Coal India Ltd. (India) – Ongoing

Challenge: KPMG was engaged to help indentify bring about efficiency-improvement in operations across CIL’s 400+ mines

Approach: KPMG’s approach was applied to the project and multiple efficiency improvement opportunities were identified for implementation along with culture building. Key programs are centred around:

- Continuous improvement program targeted at throughput increase, cost reduction & quality improvement (including culture & employee engagement improvement)
- Procurement cost reduction by adding new capabilities, standardizing minor equipments, centralizing purchase and using e-procurement wherever possible.
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