Delivering a step change in organisational productivity

Findings from the Australian Oil & Gas Productivity and Innovation Survey

A collaboration between the University of Queensland Business School, the UQ Centre for Coal Seam Gas and EY, for the Australian Petroleum Production and Exploration Association.

May 2013
Executive summary

Operators and service providers in the Australian oil and gas industry face significant challenges. Productivity is at the forefront of these challenges, with executives, employees, policy makers and regulators interested in how to improve this critical measure. In our study we analysed more than 300 variables impacting productivity for companies in the Australian oil and gas industry and found that innovation is the single most important driver of organisational productivity.

Our research and analysis was targeted at the organisation level. We wanted to understand how individual oil and gas operators and service companies were able to lift productivity, business performance and competitiveness to the next level. Key questions in the study included:

- What are the drivers of organisational productivity?
- What are the barriers to productivity?
- What can we learn from organisations who have achieved productivity improvements?

To answer these questions we surveyed over 80 Australian oil and gas companies and conducted 14 executive level interviews. This allowed us to develop a detailed understanding of the factors impacting organisational productivity.

The key findings from our study are:

1. **Productivity is core to growth**
   High growth companies tend to have a clearly defined productivity agenda and a set of targets to deliver profitable growth, relative to their low growth peers.

2. **Organisational productivity is not being measured effectively.**
   Our research found that 55% of respondents are not measuring organisational productivity. This is a surprising result given the prominence of ‘productivity’ in industry debate. A lack of measurement suggests that many organisations may not truly understand their organisational productivity. The lack of effective measurement will also impact efforts to improve organisational productivity.

We collected data on more than 300 variables impacting productivity for companies in the Australian oil and gas sector. We found that, of the many variables we analysed, innovation is the single most important driver of productivity improvement at the individual company level.
Organisations that innovate are 40 times more likely to have productivity increases than the rest of the sample.

3. **Innovation is the number one driver of organisational productivity.**
   After modelling more than 300 variables, we found that innovation stands out as the most important driver of productivity. Organisations that innovate are forty times more likely to have productivity increases than the rest of the sample. In addition, productivity was strongly linked to two other factors: improved competitive positioning and collaboration.

   **We also found that the most significant barriers to meeting business objectives are:**
   - Lengthy project approval (cited by 54% of respondents)
   - Government regulations/red tape (49%)
   - Environmental regulatory uncertainty (41%)
   - Shortage of skilled labour (41%)
   - High Australian dollar (39%)

Overall we found that about 20% of companies were able to improve organisational productivity, despite these barriers. The organisations that were innovative were the most likely to have improved their organisational productivity. Other strategies that helped productivity growth included collaboration, especially with peer firms, and improved competitive positioning.
This study is a collaboration between EY and the University of Queensland Business School. Financial support was provided by the University of Queensland Centre for Coal Seam Gas. The study has been supported by APPEA and all study participants are APPEA members.

“Australia is blessed with vast petroleum reserves for both domestic use and export. Developing those resources across predominantly different landscapes is a challenge that requires state of the art technology, productivity excellence and innovation. The challenge is amplified by rising capital costs and an increasingly competitive global market, placing enormous strain on efforts to reach our full potential. This study provides an evidence based view of the state of productivity and innovation, while highlighting the hurdles that must be overcome if Australia is to become a global centre of excellence for energy.”

1 Rick Wilkinson, Chief Operating Officer – Eastern Region Australian Petroleum Production & Exploration Association Limited (APPEA)
Productivity is mission critical in Australia and for good reason. For much of the past 10 years the Australian economy has delivered poor productivity results. The poor productivity data has had everyone asking “why?”, with governments, businesses, unions and regulators all offering their views. Commentators, analysts and researchers have joined the debate, offering a range of views and some weighty reports. While arguments abound as to the root causes of Australia’s productivity problem, everyone agrees that productivity matters.

The Australian oil and gas industry is no exception, with productivity an important topic for analysis and debate. The topic is complex, with productivity applicable at many levels within the industry. For economists studying the industry, the focus is on sector productivity, with measures such as ‘multi factor productivity’ being the main focus. For operators and service providers, the focus is much more on organisational productivity. They ask:

What can my organisation do, today, to lift its productivity?

This report examines such a question. More specifically, this report provides key evidence on the current state of productivity and explains how individual organisations in the industry are responding to the challenge of increasing their organisation’s productivity in challenging times.

Organisational productivity is the measure of an organisation’s ability to employ its available resources at any given point in time, in an effective and efficient manner such that it achieves a set of desired goals and valuable outputs. There are many measures of organisational productivity but they all include some measure of ‘outputs per unit of input’. Some examples reported in our study: well completions per team per week; metres of pipe laid per person per day; number of metres drilled per minute.

2 Reference: Reserve Bank of Australia, 2012; Grattan Institute 2011.
Everyone measures productivity, right?

The first finding from our study, and one of the most surprising, is that many organisations do not measure organisational productivity. Specifically, in our survey, only 45% of businesses reported any sort of productivity measurement.

An organisation without explicit productivity measurement will struggle to identify and deliver productivity improvements. Indeed, without regular reporting of productivity levels we contend that an organisation cannot create the environment for continuous improvement that is critical to the delivery of productivity growth.

In fact, our study revealed a strong link between overall business growth and productivity measurement. Specifically:

- Organisations that measured productivity increases in the past year have more aggressive growth targets than organisations who did not measure productivity improvements
- Organisations that measure labour productivity are two times more likely to have double digit growth intentions and three times more likely to innovate

It is no surprise that we emphasise: Identifying your key productivity drivers and measurement is the critical first step in achieving productivity improvement and business growth.

What drives productivity within organisations?

Our field work collected data from over 80 oil and gas companies in Australia. Respondents ranged from major oil and gas producers to smaller specialist firms serving the Australian industry.

Our survey measured over three hundred variables but only three stood out as being highly correlated with improvements in productivity:

1. Innovation
2. Improved competitive positioning
3. Collaboration

Industry implications

Construction and operation of oil and gas facilities depends heavily on a diverse supply chain. The lack of widespread productivity measurement within individual organisations in the supply chain has implications for the industry as a whole. Specifically, identification and achievement of productivity gains across the industry will be impeded by a lack of productivity measurement across its supply chain.
**Innovation** is the implementation of a new or significantly improved product, service, process, business practice, marketing method, or organisational method. Our definition includes both novel innovation (‘doing new things’) and incremental innovation (‘doing what we do better’).

**Improved competitive positioning** means increasing four specific competitive factors, relative to your peers. The factors are: established reputation; the degree of specialisation in oil and gas offerings; the range of offerings; and, the ability to execute projects in a timely manner.

As expected, most organisations in the survey have a reputation for delivering on their oil and gas offerings. The key finding is that organisations that improve their competitive standing also improve their productivity.

**Collaboration** is the ability of the various players in the industry to design ‘healthy, dynamic and resilient interconnected networks’, capable of mobilising the right resources, at the right time, to execute and innovate as barriers emerge.

As stated, our study considered a comprehensive inventory of more than 300 variables influencing organisational productivity. The word cloud below illustrates the relationships between key factors and organisational productivity. A factor is yellow if it has a positive correlation with productivity; red if it has a negative correlation. The larger the font, the larger the effect.

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**Figure 2: Factors impacting organisational productivity in the Australian oil and gas industry**
1. Innovation

Innovation stood out as the number one driver of productivity against a robust set of most likely contributors and detractors. Having at least one innovation in the past three years means that the odds are 40 times higher that productivity will improve. This was the strongest relationship found in our study. For organisations to see a material improvement in productivity, an environment that fosters innovation is fundamental.

Figure 3: Link between innovation and productivity

- Innovators are much more likely to achieve productivity increases because:
  - Innovators create the right conditions inside their business to overcome productivity barriers as they emerge (they promote ‘fresh thinking’ in every situation)
  - Innovators promote appropriate risk taking and risk sharing (within their business but also with their business partners)
  - Innovators capture their lessons learned and share them openly (within the business and with their business partners)

Examples

Our field work and executive interviews uncovered many examples of innovation. The Arrow LNG case study (on page 13) explains how this major operator re-imagined their business model as a ‘well factory’. The Origin case study (on page 16) features the innovative approach of training landowners as field services providers.

Many other innovations were uncovered in the study, including: new geophysics software products, new pipeline construction methods, improved tubular cargo handling systems and new land rehabilitation services.

Our research also identified schemes designed to foster workplace innovation:

- A number of companies invite their employees to share ideas, with the best ideas being granted ‘seed capital’ for implementation. Some companies have even extended this approach to their suppliers.
- Some companies are operating internet based ‘innovation hubs’. This is a secure website where staff can upload their workplace innovations and in a matter of minutes the entire workforce has access to the idea (for replication in their own work).
“Nowadays, there is a greater recognition that the high exchange rate is likely to be quite persistent and firms are adjusting to this. We hear from businesses right across the country that they are looking for improvements and that many are finding them. We are now seeing some tentative evidence of this in the aggregate productivity data.”

Barriers
The study revealed that for many organisations the biggest spur for innovation is the challenging operating conditions that many businesses are facing. Organisations cited the following as performance obstacles that had to be overcome:

- Lengthy project approval (cited by 54% of respondents)
- Government regulations red tape (49%)
- Environmental regulatory uncertainty (41%)
- Shortage of skilled labour (41%)
- High Australian dollar (39%)

Some organisations have innovated their way through these issues and even reported higher organisational productivity as a result. It is an interesting finding: obstacles drive innovation and innovation drives productivity. Our conclusion (again counter intuitive) is that the existence of commonly cited factors for low productivity (for example, high Australian dollar) do not necessarily mean that low productivity will occur.

Government and regulators should not misconstrue this message. The obstacles cited by industry participants are significant barriers to the overall development and competitiveness of the industry. The obstacles still impact industry level productivity, organisational profitability, growth and jobs.

Government and regulators need to play their part and address these barriers so that organisations can deploy their scarce resources in other areas of need.

Our study recognised two classes of innovation, being incremental innovation (‘doing what we do better’) and novel innovation (‘doing new things’). Our study also recognised six types of innovation.

<table>
<thead>
<tr>
<th>Types of innovation</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Product innovation</td>
<td>New geophysics software</td>
</tr>
<tr>
<td>Process innovation</td>
<td>Continuous pipeline construction method</td>
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<tr>
<td>Distribution innovation</td>
<td>Tubular cargo handling systems</td>
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<tr>
<td>Service innovation</td>
<td>Rapid land rehabilitation</td>
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<tr>
<td>Service distribution innovation</td>
<td>Landowners trained as field services providers</td>
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<tr>
<td>Management innovation</td>
<td>Better methods of safety training</td>
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3 Philip Lowe, Deputy Governor, Reserve Bank of Australia, 19 March 2013  
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Case study: Arrow LNG Project

The multi-billion dollar Arrow LNG project comprises five major components: two expansions of gas fields (in the Surat and Bowen basins); a liquefaction plant on Curtis Island, off Gladstone; and two major pipelines to transmit gas from field to plant.

The drilling program was identified as the most critical element of the project with significant subsurface risks and up front costs. Management reflected that “drilling is a value driver” and that a “fresh thinking” approach was required. Management recast the company’s purpose so that it was more than just ‘building assets’ and a new concept of ‘the Well Factory’ was introduced. This encouraged the pursuit of a leaner and more agile operation in the field and at headquarters. This management and organisation innovation led to a significantly more modular and repeatable drilling process. It also promoted water recycling innovations supporting pit-less drilling.
2. Improved competitive positioning

Our analysis revealed that ‘improved competitive positioning’ was the second strongest driver of productivity in our study. Improved competitive positioning means increasing four specific competitive factors, relative to your peers.

The factors are:
- Established reputation in the industry
- The degree of specialisation in oil and gas offerings (product/service/technology)
- The range of oil and gas offerings (products/services/technology)
- Ability to execute projects and operations in an effective manner

As expected, most organisations in the survey have a reputation for delivering on their oil and gas offerings. We found that organisations that improved their competitive positioning increased the odds of a productivity increase by nearly 15 times.

This is the key finding: that those organisations who improve their relative competitive standing also improve their productivity.

For example, in the unconventional oil and gas segment, organisations are pioneering new drilling and extraction technologies and operating practices so that they can deliver predictable product flows across a vast geography at the lowest operating cost per hour.

Coordinated improvement in competitive positioning underpins the productivity of a large number of firms in our sample.

We also found that, as the number of innovations a firm produces increases, the more important this ‘competitive positioning’ factor becomes. In fact, for organisations with very high levels of innovation, ‘competitive positioning’ becomes the most important factor in predicting productivity improvement.

The research is telling us that improving competitive positioning matters. Indeed, when it comes to productivity growth, improving relative competitive standing matters more than most other factors.
Improved competitive positioning means increasing four specific competitive factors, relative to peers. Each factor was measured on a scale of one to five where one means ‘not a competitive advantage’ and five signifies ‘key differentiator’. Organisations that improved their competitive positioning increased the odds of a productivity increase by nearly fifteen times.

Case study: Senex Energy Ltd

Senex is a listed Australian oil and gas business with interests in the Cooper and Surat basins. The management of Senex Energy were faced with a key challenge: how to develop and maintain their competitive advantage in a segment of the industry facing increasing competition and, simultaneously, rising costs.

The cost of drilling in an unconventional setting is significantly more expensive than conventional oil and gas drilling. Senex continuously uses lessons learnt from conventional drilling and innovation to drive down the costs of unconventional drilling. Three factors were key to deepening their competitive advantage:

- Including field team members in the design and planning of the drilling program (not just its execution)
- Determining the key drivers of drilling performance and measuring and reporting these in real time to drilling staff
- Instilling a ‘One Team’ mindset where everyone is expected to look for opportunities to innovate

By responding to competitive pressures Senex has been able to significantly improve its organisational productivity.
3. Collaboration

Collaboration emerged as the third most important driver of productivity in our study. We defined collaboration as the ability of the various players in the industry to design ‘healthy, dynamic and resilient interconnected networks’, capable of mobilising the right resources, at the right time, to execute and innovate as hurdles emerge.

As we expected, collaboration in the industry is widespread with more than two thirds of respondents having participated in some form of collaborative arrangement. Our study revealed that collaboration with ‘another firm in the same line of business’ was most important in terms of productivity.

Specifically, we found that each additional collaboration with another firm in the same line of business increased by up to four times the odds of seeing productivity gains. A similar relationship was with higher education and research institute collaborations ‘almost three times, and potentially up to seven times’. Multiple collaborations of each type increased the relationship.

Case study: Origin Energy

Origin and its partners are developing the APLNG project, a multi billion dollar CSG LNG plant in Queensland.

Origin is responsible for the upstream portion of the project with thousands of wells to be drilled in regional Queensland. Landowners communicated to Origin that they valued: privacy, retaining control over their land, and involvement in day to day activities in the industry.

Origin piloted the ‘Working Together Program’ to give landowners involvement in the industry, enhanced control of their land and less intrusion. This included training of local people (with recognition of prior learning) in delivery of field services on a day to day basis. The program was only possible through multi party collaboration including Origin, AgForce, the Queensland Farmers Federation and the Queensland State Government.

Landowners benefit by receiving recognised training, up skilling and additional income from Origin with long term partnership arrangements. Origin will benefit from increased productivity and long term engagement of landowners who are passionate about their land.
The type of collaboration is important. Interestingly, other collaborations did not show the same link, these included collaborations with suppliers, customers and consultants. Of course these types of collaborations can and do add value to organisations, however they did not lead to measurable productivity improvements in our study.

The leading reasons for collaboration in our survey were:

- Developing special services/products required by customers: 80%
- Gaining access to (or spreading costs of) new equipment, technology or information sources: 73%
- Management and staff development: 50%
- Involvement in collaborative R&D related to grants: 50%
- Supply chain streamlining: 45%
- Outsourcing: 45%

EY have recently released the fourth installment of the ‘Australian Productivity Pulse’:

- The Pulse identified $305 billion in untapped productivity potential in the Australian economy
- Four in five (85%) workers believe they could be more productive in their role to some degree
- To unleash their productivity potential, organisations must measure and communicate about productivity
- In organisations that measure productivity, the Pulse found 88% of workers strive to increase productivity
Productivity is a mission critical issue for the Australian Oil and Gas industry. To improve the productivity of the industry and its participants, and to secure sustainable growth we recommend the following:

### Oil and gas companies, both operators and service providers, seeking to improve their individual organisational productivity should:

<table>
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<tr>
<th>Ensure that productivity is being measured and reported within your organisation</th>
<th>Begin by identifying the key drivers of value for your business. Then select appropriate measures to track organisational productivity. Consider measures covering capital, asset and labour productivity. Determine whether you need to use different metrics for different parts of your organisation. In all cases ensure that the metrics drive teams and individuals to focus on the right things. Leveraging existing data sets and reporting frameworks will help ensure that productivity reporting is itself efficient. As productivity measurement takes hold, make sure that you have defined clear productivity improvement goals.</th>
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<tr>
<td>Put innovation at the centre of your productivity strategy</td>
<td>If you have a defined strategy for productivity (or efficiency), ensure that it sets clear productivity goals (be ambitious in your productivity drive). Then test your strategy to see that it includes specific focus on incremental and novel innovation. Assess your business to determine if the day to day working environment fosters innovation at the individual, team and organisational level. (For example, do board meetings focus explicit attention on innovation and collaboration?). Make sure that your recognition and reward systems support the right behaviours. Celebrate success and continuously improve your approach. If you don’t have a productivity strategy, you should define one as a matter of urgency. The strategy should include the elements identified above (specific productivity goals, a focus on innovation, an environment that fosters innovation, aligned recognition and reward, and continuous improvement).</td>
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<tr>
<td>Improve your competitive standing relative to your peers</td>
<td>There are many ways to improve your competitive position, so perform an assessment of which particular improvements will help your organisation be distinctive. This could mean deciding between deepening an existing technical service offering OR broadening your range of services offered. Innovative thinking will help. For example, the establishment of formal alliances with other industry players can simultaneously provide speedy access to specialised capabilities and additional delivery capacity.</td>
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<tr>
<td>Find ways to lift external collaboration</td>
<td>While any external collaboration can help, better results will come from targeted collaborative arrangements that help you differentiate in the market. Service providers especially should consider how to lift collaboration with other firms in your line of business.</td>
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### Law makers, regulators and other stakeholders should support the industry and the wider economy by:

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<tr>
<th>Eliminating or reducing barriers to productivity at the industry level</th>
<th>Address key barriers including: lengthy project approvals; excessive/misaligned/duplicated regulations and red tape; uncertainty around environmental regulations.</th>
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<td>Developing policy positions that enable productivity growth at the organisation level</td>
<td>Develop a deeper understanding of the drivers of organisational productivity (for example innovation, competitiveness, collaboration). Then develop/maintain policy positions that support and enable these drivers (for example, R&amp;D tax incentives promote novel innovation).</td>
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Appendix

The study was designed by the University of Queensland Business School drawing on proven academic research methods supplemented by the School’s own experience in previous studies of this type. The study followed a typical pattern with detailed field work (a survey and executive interviews), then analysis and modelling, supplementary field work (follow up), peer review and publication.

Study methodology

Over 80 firms participated in the survey, being about 27% of the 300 organisations we approached (being, APPEAs membership). The high participation rate makes this one of the most comprehensive studies of organisational productivity and innovation for any industry, anywhere in the world. A profile of the participating firms is provided below.

The survey for this study is based on the Innovation and Growth Survey developed by the Centre for Business Research at Cambridge University. That survey has been used and adapted over 20 years in the UK and Europe and is designed to investigate factors that determine growth and performance in firms.

For this APPEA study, we added variables specifically related to the activities of the oil and gas industry. We also added material to specifically tease out relationships between productivity, growth and innovation.

The final survey included more than 300 variables relating to growth, management, performance, business conditions, innovation and external collaborations.

The Cambridge survey measures three main types of innovation in product, process and services. It also recognises the importance of incremental innovation (new to firm) and radical innovation (new to industry). This is a more accurate measure of innovation compared to counting R&D expenditure and patents.

We measured productivity using financial data reported by the firms but the survey also asked firms if they measured productivity (labour and capital) and if their measurement was reporting improvement or decline.

The field data was analysed using regression techniques. Models were developed using the SPSS tool. Factor analysis allowed the grouping of certain variables into composite variables. Correlation analysis and calculation of odds ratios informs the majority of statistical relationships reported in the study.

Analysis of participants

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<tr>
<td>Operators</td>
<td>25</td>
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<tr>
<td>Other firms</td>
<td>55</td>
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Participants in the study

Our field work collected data from over 80 oil and gas companies. Respondents ranged from major oil and gas producers to smaller specialist firms servicing the industry in Australia. We also conducted 14 executive interviews. Whilst all companies participated anonymously, quotes and case studies were approved before use. A demographic profile of the 80 participating companies is provided below.

Firm sizes (staff) average 800, sd – 2000

- Less than 5 staff: 5%
- 5 to 19 staff: 21%
- 20 to 199 staff: 31%
- More than 200 staff: 13%
- More than 1000 staff: 10%

Firm ages average 25 years, sd – 30

- Less than 5 years: 11%
- 5 to 9 years: 19%
- 10 to 19 years: 16%
- 20 to 29 years: 15%
- 30 to 59 years: 10%
- 60 to 175 years: 8%
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