

# Innovation in the Queensland Road and Bridge Industry

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# Executive Summary

A recent Commonwealth Government report suggested that ‘innovation is the key to the future international competitiveness of all Australian industries’ (DITR 2002, 33). This report provides information on improving innovation performance in a critical industry sector – the Queensland road and bridge industry.

The report is based on an survey of 208 organisations in the industry, including clients, consultants, contractors and suppliers. Two types of innovation activity – original (inventive) and adoptive (imitative) innovation – were investigated. The main focus was on adoptive innovation, which involves the uptake of existing technologies and advanced practices.

The aims of the study were threefold, to:

1. Describe the processes underpinning adoptive innovation (involving innovation drivers, strategies, impacts and obstacles);
2. Distil the characteristics of successful innovators (based on three dimensions: original innovation, knowledge networking, business strategies/business environment); and
3. Provide options to foster an improved innovation culture.

Overall the study highlights the role of people, rather than technical factors, in shaping innovation outcomes. The report sets out a number of specific public sector challenges and suggests improved innovation performance in the sector will require providing more effective incentive schemes to encourage employees to vigorously pursue innovation. Although potential for improvement exists, overall innovation levels are internationally comparable.

## Adoptive Innovation Processes

The level of adoption of key advanced technologies and practices in the Queensland road and bridge industry exceeded that of the Canadian engineering construction industry. Such adoptions yielded significant benefits. More than three-quarters of respondents rated the impact of their most successful adoption as ‘high’ or ‘very high’. The most successful *type* of adoption identified by survey respondents was ‘business practices’ (such as quality systems and human resource strategies).

Financial factors were dominant drivers in the innovation process, while client actions were also influential. Financial factors also dominated as obstacles to innovation. Conservative attitudes, primarily in the public sector, were an additional obstacle identified by a significant number of respondents.

The two main strategies used by respondents to ensure the success of innovations were:

- evaluation techniques, such as reviewing and monitoring activity; and
- staff-related strategies, such as training, encouraging suggestions for improvement, attracting quality staff, and providing positive feedback.

Many respondents indicated that they were seeking guidance about better ways of effectively evaluating innovations. Although the need for evaluation strategies was evident, nearly half of respondents had no strategy.

The key points to emerge from analysis of the industry's adoptive innovation processes are the importance of business practices, alongside technical development; and the scope for improvement in innovation outcomes through better management of client actions, bureaucratic attitudes, evaluation strategies, and staff.

## Original Innovators

The most popular type of original innovation undertaken was business practice improvements, which reinforces the observations above about their importance. The survey results showed that original innovators are most likely to be:

- located in the private sector, where a greater acceptance of risk is found;
- product suppliers, integrated into manufacturing networks;
- from the south-east region where greater diversity and strength of innovation partners is likely to be found due to high population densities;
- large organisations, consistent with the findings of other studies about the positive correlation between innovation and firm size; and
- leaders in *both* original (inventive) innovation and adoptive (imitative) innovation, supporting findings in the literature about the complementary skills required for the two types of innovation.

## Knowledge Flows

Academic literature globally demonstrates a link between involvement in knowledge networks and innovation performance (eg. OECD 1996). The current study examined two types of involvement in knowledge networks: consultation activity and sources of ideas for improved technologies and practices.

DMR district offices, local governments and suppliers stood out as key nodes in consultation activity. Given the links between involvement in knowledge networks and innovation performance noted above, we might expect these three types of organisations to be relatively innovative compared to other types of organisations in the industry. Indeed, this is the case for DMR district offices and suppliers, however it seems that local governments are not benefitting in the same way from their key role in consultation activity (eg. Figure 4.4).

The links between consultation activity and innovation performance were further demonstrated in this study by statistical analysis which showed that *the level and diversity of consultation between industry participants was a significant factor in determining an organisation's innovation adoption levels.*

Other key findings were that:

- frequent communication with suppliers is one of the features contributing to some contractors being more innovative than others;
- DMR district offices are more innovative than local governments; and
- large organisations are more innovative than small organisations.

The second aspect of knowledge flows examined in this study – sources of ideas – also provided information about successful innovators. The three highest ranked sources of ideas about technologies and advanced practices in the industry were in-house sources, previous projects and industry associations. Organisations should focus on these key sources *and* pursue a strategy of consulting a wide range of sources if they want to be successful innovators. A key finding of this study was that *more extensive consultation of sources of ideas is positively correlated with higher levels of innovation adoption.*

## Business Strategies and Conditions

Organisations with strong commitment to business strategies in the following areas were more likely than other organisations to be successful innovators:

- intellectual property;
- research and development;
- employment of new graduates;
- setting industry standards;
- adopting new technologies;
- developing a 'no blame' culture;
- developing technical capabilities; and
- maintaining good relationships with existing clients.

The prioritisation of these strategies was a key feature of innovative organisations.

It was also possible to differentiate innovative businesses from less innovative businesses on the basis of their perception of the environment in which they operate. Organisations which strongly perceived the existence of the following business conditions were more innovative than other organisations:

- many potential suppliers;
- supportive external linkages; and
- rapid technological change.

# Improving Innovation Culture

DMR can play a key role in improving innovation culture both internally and within the industry, particularly by promoting a 'no blame' environment for innovation. A key point to emerge from the study was the importance of providing adequate incentives to promote the risk taking which leads to successful innovation. The findings also highlighted the critical role of people in *driving* innovation and the particular challenges facing the public sector, especially the need to address risk-averse bureaucratic attitudes.

Further, the study demonstrated the key role played by knowledge in driving innovation performance. The importance of taking pro-active and sustained measures to foster knowledge sharing and collaboration within and among organisations cannot be stressed enough. As the leading client in the Queensland road and bridge industry, DMR is uniquely placed amongst road agencies in Australia to foster innovation as it has retained an extensive knowledgeable and experienced workforce. But to what extent is knowledge shared across organisational boundaries? Interviews associated with the current study suggest that considerable gains could be made by improvement in this area.

One suggested approach is for DMR to create a position for a highly placed Knowledge Coordinator within the organisation who assesses and progresses internal ideas, and provides access to commercialisation/start-up experts to maximise potential benefits from innovations. The Coordinator would also identify and progress knowledge outputs provided by consultants engaged across the organisation. These outputs could be distributed in substantially abbreviated forms, re-written in several versions to address the interests of particular groups of stakeholders. The Coordinator could also usefully monitor the knowledge outputs of key industry participants and collaborative arrangements existing within the industry.

This report contains additional resources to assist in improving innovation culture, including management checklists and a summary of international organisations dedicated to improving innovation, particularly in the public sector.