CSIRO STAFF ASSOCIATION

Submission

in response to the Productivity Commission's

Draft Research Report on

Public Support for Science and Innovation

December 2006

Introduction

The CSIRO Staff Association thanks the Productivity Commission for the opportunity to provide comment on the Draft Research Report on Public Support for Science and Innovation. We have previously made a submission into the inquiry in August. The Draft Research Report is an extremely valuable contribution to the policy debate on science and innovation in Australia. This submission addresses only the issues where we believe the Commission's findings need further exploration.

The CSIRO Staff Association seeks to emphasise the following major issues as part of its submission:

1. CSIRO's real level of public support has been declining for nearly a decade and needs to be increased;
2. greater recognition that Australia's scientific challenges requiring public R&D are proportionally larger than most other OECD countries, relative to our GDP and population;
3. capability gaps are increasingly becoming evident within CSIRO and accordingly need to be addressed by enhanced public support and capability management; and
4. CSIRO's role in incremental R&D is as critical as ever in transforming industries, particularly in the agricultural and manufacturing sectors.

Real levels of public support for CSIRO

Between 1997-98 and 2004-05, CSIRO's public appropriation increased at a nominal rate of just 3.4% per annum. CSIRO's share of Australian Government support for science and innovation declined from 12.6% to 10.6% over the same period. However, at the same time, CSIRO's expenditure base has increased by approximately 5% per annum notwithstanding extensive restructuring and job cuts to reduce costs. CSIRO's public appropriation would need to increase by approximately 6-7% per annum (not 3.4%) simply to sustain its research capability, assuming steady growth in its other income streams (2-3% per annum).

The Staff Association welcomes Draft Finding 10.1 but recommends to the Commission that the 'current real level of public appropriation funding' relate to CSIRO's actual costs in delivering research. As public funding has cumulatively declined relative to the expenditure base, CSIRO has lost significant capability in key areas (see 'Capability gaps' below). It could only strive to address this funding shortfall by diverting significant resources into seeking increasing rates of external investment. This strategy has not been successful in the past and was not supported in the Draft Research Report or in recent external reviews of CSIRO Divisions and the Flagships program.

The Draft Research Report also comments that Australia devotes a high proportion of its total science and innovation budget to public sector research agencies (including CSIRO), without providing an adequate analysis of the appropriateness of this situation. The CSIRO Staff Association submits that CSIRO should receive significantly enhanced levels of public funding to expand its research capability (not only sustain it) because:

1. national public sector research agencies are the most appropriate organisations to coordinate research effort around national research priorities, due to their breadth of multi-disciplinary skills, capabilities and partnerships;
2. the dramatic scientific challenges now confronting Australia (see 'Australia's scientific challenges' below) urgently require enhanced public support;
3. CSIRO's priority setting and performance management, although not perfect, affords good accountability to the investment of public research funds (as recognised in Draft Finding 10.1);
4. supporting CSIRO through sufficient block appropriation funding allows it to make strategic investment decisions and maintain broad capabilities (as noted in Draft Research Report p.10.1); and
5. supporting CSIRO through block appropriation funding, as compared to competitive grant funding or contracting out, involves lower transaction costs and greater efficiency (as noted in Draft Research Report p.10.6).

Australia's scientific challenges

The CSIRO Staff Association supports the Commission's acknowledgement, reiterated at the FASTS workshop on the 16th of November 2006, that Australia has proportionally larger scientific challenges in comparison to other OECD countries. These challenges include, but are not limited to, environmental sustainability, biodiversity, global warming and water.

Australia comprises approximately 5% of the global land mass and 1% of the world's GDP, with only 0.3% of the world's population. The continent also has an extensive coastal marine zone and an abundance of unique flora and fauna. Our R&D effort must have greater correlation with our land, ocean and environmental responsibilities, as compared to our economic ones.

We already do 2-3% of the world's science. This allows us to conduct research in Australia and for Australia, and it facilitates access to R&D throughout the rest of the world. However, we need to do more to meet our global environmental responsibilities.

The Staff Association recommends that the final report include more detailed analysis of the appropriate levels of public support needed to address these scientific challenges. In terms of funding decisions, it is too simplistic to compare Australia's R&D indicators to OECD benchmarks when it is acknowledged that our responsibilities are proportionally greater.

Expert advice is readily available from CSIRO, the Chief Scientist and other public sector science agencies, but much more could be done to address these national challenges if they received greater long-term public support.

Capability gaps

The Draft Research Report (p.10.21) noted that the Commission had no hard evidence on capability gaps and that it was difficult to assess CSIRO's ability to respond to future challenges. The CSIRO Staff Association does not have the capacity to provide comprehensive evidence of gaps across the spectrum of research capabilities in the national

innovation system. We utilise information from our members and observe CSIRO trends in the loss of capabilities in particular areas.

Over the past five years, CSIRO has lost significant capability in:

1. sheep, wool and textiles research;
2. steel and alumina research;
3. wildlife ecology and conservation;
4. soil and landcare research;
5. forestry research;
6. atmospheric research; and
7. taxonomy.

There are also emerging capability gaps in:

1. water and natural resource management;
2. energy research, including renewables; and
3. mathematics and information technology.

CSIRO itself acknowledged that it had the capacity to support additional worthwhile research if greater funds were provided (Draft Research Report p.10.21). These funds would be utilised to fill capability gaps in critical areas of research.

CSIRO is also moving towards a capability management framework within its own operations which we are hoping will provide greater job security and improve the nexus between skills, training and research capabilities in the organisation.

Incremental innovation

The CSIRO Staff Association is concerned with some of the statements contained within the Draft Research Report that relate to incremental innovation and agricultural and industrial research. The report (p.10.12) acknowledges that a decreasing proportion of CSIRO's appropriation is being directed to incremental innovation for existing industries, in favour of pursuing a co-investment approach.

We believe there may be a tendency to segregate the classification and value of incremental R&D from transformational science. There are many examples of 'incremental innovation' at CSIRO where the research has ultimately transformed industries in Australia, either through cumulative innovative steps or by sustaining long-term capability, thereby increasing the likelihood of major breakthroughs. We draw your attention in particular to the case studies in our initial submission on hydraulic fracturing, gas to liquids and sheep and wool production.

We also wish to highlight a key econometric publication which considers R&D related to incremental innovation. Balcome, Bailey and Fraser[1] found that standard sequential reduction approaches to modelling dynamic relationships may be sup-optimal when long lag lengths are required. Long lags were found in the relationship between R&D expenditures and productivity in both the U.K. and U.S., which remained undiscovered when the standard approaches were taken. The tendency to undervalue incremental R&D from an econometric perspective needs to be addressed in the final report.

The Draft Research Report (p.10.11) also states that the Commission considers CSIRO's work in incremental innovation to pose the greatest risk of encroaching on potential private sector research activities (the additionality issue). However CSIRO endeavours to 'not fund research that the private sector is likely to support itself' (Draft Research Report p.10.13). The CSIRO Staff Association believes that it is appropriate for CSIRO's internal investment processes to continue to prioritise funds towards incremental innovation consistent with this objective.

In terms of agricultural research, Kingwell and Pannell[2] reported on the economic trends and drivers affecting the sustainability of farm businesses (in the WA Wheatbelt). They concluded that some profitable businesses will remain over the next 25 years, due principally to the investment in R&D across a diverse research portfolio. We also refer the Commission to an additional case study in our initial submission on sustainable water usage. This work, led by Dr Mike Young, explored policy considerations for the long-term sustainability of rural industries, environment and communities.

The CSIRO Staff Association submits that R&D that is strategically allocated to sustain agricultural as well as industrial/technological capabilities will be a significant factor in Australia's future prosperity and sustainability.

Conclusion

The CSIRO Staff Association congratulates the Commission on a comprehensive Draft Research Report. With this submission, we wish to highlight the need for:

1. enhanced block appropriation funding for CSIRO;
2. improved analysis of the level of public support required to address Australia's national challenges;
3. a better understanding of capability gaps within CSIRO and the national innovation system; and
4. a greater appreciation of the value of incremental R&D, particularly with agricultural and industrial research.

The CSIRO Staff Association acknowledges its members, particularly representatives on the Research Policy Committee, in contributing to both of our submissions into the Productivity Commission Inquiry into Public Support for Science and Innovation in Australia.

References

1. Balcome, K., Bailey, A. and Fraser, I. (2005) Measuring the impact of R&D on productivity from a econometric time series perspective. *Journal of Productivity Analysis, 24, 49-72, Springer Science.*
2. Kingwell, R. and Pannell, D. (2005) Economic trends and drivers affecting the Wheatbelt of Western Australia to 2030. *Australian Journal of Agricultural Research, 56, 553-561, CSIRO Publishing.*