

Future outlook and directions for forest industry research

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This is an important time for the New Zealand forest industry and for Scion as its primary research provider. The world economy has yet to recover from the global financial crisis, with IMF (2013) forecasts of growth for this year recently revised downwards to 3.5 per cent. Nearly all of this growth will occur in emerging markets, notably the ASEAN countries, India and the African continent.

Other features of the recovery, especially in developed economies, include –

- Job-free growth with new or improved technology, particularly information technology, or product substitution
- An emphasis on green growth or clean technologies
- Rapidly changing dynamics in the energy markets.

The discovery of new gas supplies by hydraulic fracturing and more energy-efficient transport are two important factors shaping the energy sector.

Other main factors are also part of the mix. These include rapidly changing markets, changes in geopolitical and financial power, growing scarcity of productive land and water resources, and steadily accumulating evidence of the seriousness of climate change. It is within this context that the New Zealand government (2012) is seeking to grow export earnings from the current less than 30 per cent of GDP to at least 40 per cent by 2025. Meeting this target will require an average annual compound growth of about seven per cent and must involve expansion of current industries, especially in the primary sector.

The unprecedented combination of circumstances means this target is far from a ‘business as usual’ scenario. The need for export growth presents not only an opportunity, but also a technological challenge for a resource-rich country such as New Zealand and for its forest industry.

Industry Strategic Action Plan

The New Zealand forest industry is strongly aligned with the government’s export drive via the NZ Wood Council’s (WoodCo) Forest and Wood Products Industry Strategic Action Plan. This plan sets out steps to grow export earnings from forest products and services to \$12 billion by 2022, an almost three-fold increase on present performance. A major part of this growth will come from an increased supply of logs. These logs will come from large areas planted in the 1990s which will mature in the next five to 10 years.

Successful growth also depends on –

- More onshore processing of logs up to a total of 12 million cubic metres
- Adding value to wood and fibre with new technologies
- The expansion of current and development of new markets
- New Zealand Inc branding
- Productivity gains along the supply chain.

Economic develop of Maori land and other forestry assets will also be essential.

The role of Scion

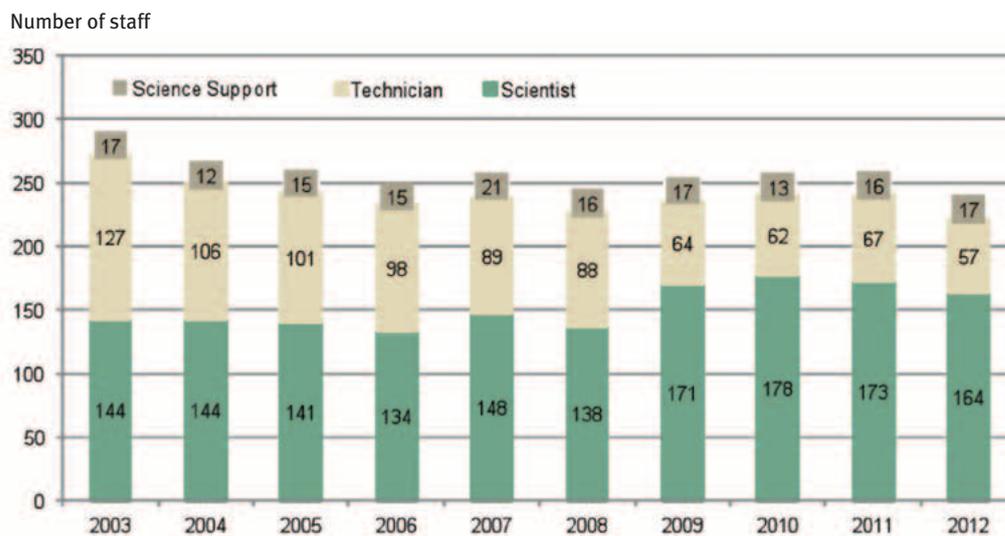
Scion is a Crown-owned entity with a core purpose dedicated to ‘innovation and growth in New Zealand forestry, wood product and wood-derived materials and other biomaterials sectors’ (Scion 2010). Scion has an important role to play in meeting the government’s business growth agenda targets, and in developing better practices and technology to enable the NZ Wood Council’s target to be met. The strategy is therefore aligned with several stakeholders and requires a balance of three investment priorities –

- Ensure long-term research is not sacrificed to just solve today’s problems
- Addressing primary stakeholder research
- Supporting the requirements of emergent industries, including new planted-forest species.

The direct allocation of core funding to Crown Research Institutes since July 2010 has helped to reduce the uncertainty about future revenue streams. However, around 60 per cent of Scion’s revenue continues to be contested or from commercial contracts. The 2013 calendar year is especially important with \$5.82 million contracts for Crown science investment ending in September. Funding comes from the Ministry of Business, Innovation and Employment, but is currently administered through Future Forest Research, a partnership between the New Zealand forest industry and Scion. Proposals to secure new investment needed to be submitted by early April, and support the government and forest growers’ research priorities for forest growth and management.

Science and innovation plan

The Forest Owners’ Association produced a science and innovation plan in 2012 which provides the direction for future research over the next decade and includes a very helpful guide to preparing investment



Trends in scientist, science support and technical staff at Scion and its predecessors

proposals. Major economic aims are to –

- Make gains in forest productivity from an increase in the mean national annual increment per hectare of forests – in the case of radiata pine to around 28 by the year 2025
- Improve processing yields by improved log uniformity and consistency
- Achieve operational efficiency gains in the supply chain.

Matters related to the sustainable use of land and water resources, and a social licence to operate domestically and internationally, also require concurrent careful consideration and investment. Here the evolving situation for dairy intensification is instructive. It highlights the need for industry leadership, brand management, effective community involvement, and awareness of the factors shaping consumer demand.

It is also important to make sure that ecosystem services, such as biodiversity and recreation generated by planted forests, are appropriately valued and recognised. Forest health and protection will continue to be a major focus of research. Combating new disease threats and controlling weeds, an increasing problem in terms of both cost and area, are two critical focus areas. Other main research topics are identifying and mitigating the risks to forests as a result of climate change, more international tourists and increased use for public recreation.

Investment in research and development

Globally US\$1.4 trillion is invested in research and development annually. New Zealand's proportion of this is currently less than 0.5 per cent. The proportion is diminishing as large emerging economies rapidly increase their research and development appropriation to grow competitiveness in their industries and solve pressing environmental and social problems.

Government investment in agricultural research and development globally is also declining, paradoxically, given the need for a 70 per cent increase in food output from the same or fewer resources by 2040. This decline has been partly offset by an increase in private sector agricultural research. However, such investment is dominated by six multinational companies, mainly in relation to germplasm, and plant and animal health, which restrict or delay the availability of information to the public.

The combination of these factors means that forest industry research and development capacity in advanced economies is either in decline or being changed into emergent growth fields such as biomaterials, waste management and energy. In Australia, for example, current forest industry research capacity is estimated to be less than 25 per cent of 2004 levels (Sinclair 2012).

Research careers

This decline is set to continue as a retirement bubble is being worked through and research investment is further reduced. Scion has experienced some decline in its research staff over recent years, although this has not been as precipitous as in Australia or the United Kingdom. The reduction in opportunities for research careers in primary production is also affecting the supply of PhD qualified graduates (Tocker 2012). Just three to five relevant doctorates are now awarded annually in New Zealand.

Focusing forest industry research

These big changes in science and innovation mean that New Zealand's forest industry research must adapt to remain internationally competitive and at critical mass. Research must be well targeted, focused on distinctive national needs, and involve strong international collaboration. Further essential requirements include –

- Direct and unequivocal industry support from a clear vision of its future, such as outlined in the

plans referred to earlier

- A long-term strategic perspective on the role of research and development
- Stable and significant mid-term funding.

Implementing these will help ensure that New Zealand has the breadth and depth of capabilities to meet the industry's future needs. Scion and the University of Canterbury in particular will be important in developing and maintaining relevant skills and experience.

New Zealand's experience of a sector-based model for funding scientific research over a 20-year period, combined with a largely non-discriminatory provision of university student funding, has shown that the forest industry's requirements cannot be met on demand and from fully contested processes. Instead, an industry culture and leadership which values the role of science and innovation must continue to be nurtured.

Specific aspects of Scion's strategy

The first aspect of Scion's strategy is to ensure the recruitment and retention of top talent. High quality science and innovation rates depend on the intellectual capacity and networks of its research leaders. Scion has to offer internationally competitive remuneration and provide world-class facilities and infrastructure. It completed a \$5.5 million modernisation of a third of its laboratories in 2012. This is part of a five-year, \$20 million capital improvement programme to modernise its Rotorua campus, upgrade equipment and install pilot plants. The cost of research to industry needs to reflect the fact that top talent is both scarce and mobile.

Next is to strengthen and form new international linkages to world-leading groups in priority areas of research and technology commercialisation. Achieving international links is interdependent with top talent – effective relationships require mutually beneficial contributions for those participating. Also, as illustrated by Scion's wood plastic pellet licence agreement with Portugal company Sonae, the scale and resources of offshore markets are often needed to commercialise technologies which will create wealth for New Zealand.

Additional aspects of the strategy include –

- Accelerating commercialisation with tighter portfolio management, multi-discipline project teams, early-stage licensing and other risk-sharing arrangements
- Improving technology translation to make sure that client requirements are accurately represented in research programmes, and that research results are in a form and language which is readily adopted
- Nurture strategic partnerships with Maori to support the economic development of their forestry assets and up the value chain

- Increase cross-sector collaboration within New Zealand to exploit technologies in areas such as genomics, land and water management, materials science, industrial design and clean technologies
- Work with non-forest industry customers to generate increased market opportunity for current wood and fibre products, such as food firms, for packaging, and new markets for new materials, polymers and chemicals which use wood fibre and diversify sources of revenue.

The next 10 years

The next decade will be markedly different from any previously experienced, and research and development for the forest industry and at Scion will reflect this. It is clear that –

- Firms and countries which invest significantly in research and development in the future will do much better than those which do not
- A proportion of research has to be invested into more speculative, but well considered, science, that can assure future competitive advantage rather than just solving today's problems, to generate transformational change and strategic intellectual property
- A combination of scientific and technological literacy and curiosity has to be developed by firms and industries if innovation is really to thrive in any country.

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