About the Fellow

Mihai Daian is a business management consultant and industry development professional with expertise in value added wood products and a strong professional interest in industry innovation and development.

He has worked in commercial and industry based projects with focus on process improvement and innovation, market analysis and development as well as processing assets valuations.

Currently, Mihai enjoys working as a consultant for the Forest Industry stakeholders assisting them to utilise efficiently their processing facilities and forest resources, and to maximise the value of the products to the customers. He has proven record of success in providing process and technical solutions and establishing effective relationships between industry members, academics and government institutions.

Mihai's knowledge is in advanced timber processing, sustainability of timber supply chains, innovative wood utilisation and the dynamics of Australian timber industry and its counterpart industry in Asian countries. His expertise extends to Australia, Asia, Africa and Pacific Countries.

Mihai has a PhD in Wood Innovations - Processing of Wood (2006) from Australia, a Masters of Science in Agricultural Economics and Management Sciences (2004) from the European Union, and a BSc in Wood Technology from Transilvania University of Brasov, Romania.

Mihai has worked in various engineering, research and consulting roles. He was Research Engineer at Swinburne University working for CRC for Wood Innovations, Postdoctoral Research Fellow for Australian Center for International Agricultural Research (ACIAR) at The University of Melbourne, research consultant/business management consultant at Pöyry Management Consulting Australia, Fitzpatrick Woods Consulting and ScienceTech Consulting. Currently, Mihai is working for Margules Groome Consulting.

Executive Summary

Background:

The present study was driven by the/a recent nanotechnology movement that emerges into the forest industries globally and considerations from leaders of the Australian forestry and wood manufacturing industry, reinforcing the need for a closer knowledge on this subject. Insights obtained directly from the Nanocellulose (NCC) products' key developers could maximise decision-making opportunities for innovation, diversification and development.

Purpose/Objective:

The main objective was to provide an informative source of materials that complements studies which have been done already in Australia, including a summary of lessons learned directly from the champions of innovation and development in the field of Nanocellulose materials. Hence, this report identifies and exemplifies the current, international developments on the utilisation of nanoscale wood cellulose materials and their production technologies, looks at how governments and private funded research can provide the best benefits to the consumers and build collaborative relationships, and provides general views of the Australian forest industry's leaders towards this subject.

Methodology:

The study involved two stages of work: first, identification of, and contact established with, the Nanocellulose products' key developers (pioneers) globally, including also desktop review for the latest bio-refinery technologies and products based on wood as raw material; second, interviews of Australian key plantation and paper companies and visits to international businesses with Nanocellulose footprint in R&D and commercial production.

Key Findings

Australian companies, although not directly involved into Nanocellulose R&D, are part of the international crowd with pro-active insights into this direction. Limitations to step-up from insights into tangible investment and development include the decision making process that belongs to the global parent company in some instances, the technology that is currently used and non-adaptable, and the current environmental regulations in Australia.

The general view is that closer knowledge is needed in regards to the economics of producing the new Nanocellulose materials and products. In addition, there is a need to understand the impacts of price fluctuations of energy and raw materials, the required critical mass/economies of scale, and ways to create links and explore synergies with interested players and technology pioneers.

There is a strong interest from the Australian forestry companies to add greater value to the forest resources and expand product portfolio through collaboration agreements that are able to establish mutual benefits for other companies, investors and potential new clients; however, a structured, fact-based approach is considered to be the way forward.

Internationally, there are examples of businesses which have made their way into the markets with potential to absorb the new Nanocellulose materials. Consistently, these organisations demonstrate a past and long term commitment to innovation and leadership in the forest industry, a characteristic which created the basis and the driver for their present production activity and innovative products.

The five key lessons learned from the experience of these forward thinking organisations include the following:

- Valuable proposals have been taken into consideration by industry lead research organisations from all sources of ideas including research organisations, private companies, industry associations, potential future clients

- Financial investment contributed by the private companies has always complemented, and in some instances even shadowing, the financial support provided by local and federal governments

- Joint ventures, established through deep understanding of each other capabilities, business structure and motivation, successfully moved forward ideas well beyond laboratory level work

- Potential future clients have been involved in all the steps towards the commercial-ready product, so that the final product was organically customised to clients and market's needs

- The studied companies were either well established business, which leveraged the external funding and access to markets through mergers and strategic alliances with market leaders, or companies established through government and private funding to demonstrate and fine tune the new products to their potential markets

From the analysis of the case studies presented in this report, one can understand that the key benefits derived from these new technologies and products include the following:

- Access to new markets such as composites, textiles, plastics which are traditional owned by the oil based products

- Creation of new, high skilled jobs for rural communities through the establishment of new and technologically advanced production facilities and associated services

- Potential to commercialise and/or use in a closed-loop system the excess heat and energy generated from the primary processing of NCC/CNF

- Accelerated technology transfers through collaboration between the research organisations, processors and consumers

- Better response to the retailers and consumers 'expectations with safe, non-toxic, environmental friendly materials

In addition, the learnings from the pioneer companies and organisations in relations to development of NCC businesses underline the need for a strong collaboration with those potential customers showing the most interest, in order to develop tailor-made products/solutions; and, hence, to create a focus on the clients with the markets with the most robust initial impact in terms of sales volume and price.

Recommendations:

In Australia, the efforts should be directed on growing and building new relationships with the global NCC and rayon champions, which are well beyond the primary research to demonstration and commercial throughputs. Further, the focus should be on attracting investors and developing joint-ventures with regional and domestic processors as well as forest owners.

The most logical organisation to lead this drive, based on what worked internationally, should be an industry-led research organisation, such as FWPA, potentially through a CRC model. Such an organisation has the potential and leverage to attract funding from both government and private sector, either directly from companies or through the industry associations. In addition, it has the mechanisms to facilitate the required research for customisation to the clients and markets needs.

A simple, practicable way forward towards utilisation of NCC (and NFC) and rayon in Australia may be based on push marketing strategy – by importing the materials which have been already developed internationally, in conjunction with close collaboration with companies with the highest and immediate utilisation potential (i.e. mining drilling lubricant, cement or paints additive).