



Forest & Wood Products Australia

Operations and Supply Chain Investment Plan Review

September 2022

FWPA

Acknowledgements

The content of this report is based on findings of a draft interim report by Greenwood Strategy, *Forest Operations and Supply Chain Investment Plan Interim review of RD&E priorities – DRAFT 21* September 2022

Background

The vision of the Grower Research Advisory Committee (GRAC)¹ is to “double the value of Australia’s commercial forests by 2040, by fostering an innovation culture in our enterprises, applying world’s best practices, collaborating and investing into research and development as appropriate”.

In support of the GRAC Vision, FWPA commissioned a suite of investment plans that provided technical reviews and business cases to guide industry investment in RD&E for the Australian forestry sector from 2019 to 2023, with an outlook to 2028 and beyond to 2040.

FWPA’s Operations and Supply Chain Investment Plan (Investment Plan)², published in 2020, identified opportunities for progressing the GRAC Vision through investments in RD&E that reduce operational costs and increase product volume and value recovery for the industry.

FWPA engaged Greenwood Strategy to review and update the Investment Plan priorities as part of a broader review of the operations and supply chain research program, based on consultation with key industry stakeholders. This project update presents an interim review of the Investment Plan priorities based on desktop review and stakeholder interviews.

This document summarises the outcomes of that review and represents an addendum to the Investment Plan, and should be read in conjunction with the Investment Plan. The Research³ Project Topics and their prioritisation supersede those in the 2020 Investment Plan.

Review Objectives

This review aims to provide forest-sector-led recommendations to the GRAC to consider when making investment decisions.

Method

A total of 25 grower companies were contacted and invited to participate in interviews. Subsequently, 12 forest industry companies were interviewed (refer to Table 1).

Table 1: Forest grower entities from which individuals were interviewed as part of the review

Australian Bluegum Plantations	Midway Ltd
Forestry Corporation of NSW	OneFortyOne
ForestrySA	PF Olsen Australia
Forico	Reliance Forest Fibre
Global Forest Partners	SFM Environmental Solutions
HQPlantations	Timberlands Pacific

Interviewees were asked to respond to four questions specifically related to the Plan:

1. Thinking about the Investment Plan’s priority activities, can you comment on their currency and effectiveness in achieving industry’s objectives as stated earlier?
2. What changes will occur in the supply chain optimisation field over the next 5-10 years that will impact the future direction of the Investment Plan?

¹ An advisory committee to Forest and Wood Products Australia.

² FWPA, 2020. Forest operations and supply chain management research, development and extension priorities, 2020. Forest Wood Products Australia, Melbourne, Australia. Adapted from Forest Operations and Supply Chain RD&E Investment Plan 2019-2014, prepared for FWPA by Prof. Mark Brown, 2019.

³ Refers collectively to research, development and extension activities.

3. Are there specific priorities you think need updating or revised for consideration in the next 5 years?
4. Are there any particular factors that you think influence how well and consistently the Investment Plan is delivered?

Table 1 shows the RD&E themes identified in the 2020 Investment Plan.

Table 1: Research themes and prioritisation as captured in the 2020 Investment Plan

Priority topic code	Research theme	Research topic	Research sub-topic	Priority
SCO 1.1.1	Improved utilisation of existing systems and technology through data analysis and extension	Implementation of new knowledge	Development of training solutions	High
SCO 2.1.1	Improved data acquisition, retention and management for supply chain ROI	Big data management	Data management, capture and use	Medium
SCO 3.1.1	Increasing the total resource ROI through extended product identification, capture and deliver	Enhanced forest products capture	Recovery of forest products from residues	High
SCO 4.1.1	Improved supply chain management frameworks and systems with increased integrations towards more efficient, safer and profitable operations	Supply chain management	Supply chain efficiency, safety and compliance	Medium
SCO 4.1.2			ROI driven supply chains	High
SCO 4.1.3			Harvester head technology	High
SCO 4.1.4			Management of within supply chain inventories	High

Outcomes

Interviewees generally acknowledged that the broadly defined focus areas of the Plan are appropriate. However, it was noted that technology is developing rapidly, mostly on the back of commercial investment to meet identified consumer requirements, which is likely to be better resourced and more responsive to the marriage of emerging technology and industry needs. Also, most enterprises and discrete regional supply chains have in place existing technology and systems solutions and relationships which they will be reluctant to change. There is a perspective, therefore, that any research that focuses on the development of technology and systems for industry uptake and/or commercialisation is not particularly useful and is likely to be overtaken by the market.

In this context, there is a view that the Investment Plan should be more clearly focused on understanding explicitly the discrete supply chains, where the challenges are, what the priorities of supply chain actors are and what tangible short- and medium-term priorities can be identified and addressed. A particular point noted by a number of growers is that there is more value to be had investigating the available data and identifying the specific metrics that supply chain actors should use to enable them to focus on and improve supply chain value and to bridge systems between enterprises along the supply chain. An example of this was the identification of metrics around High Performance Vehicles which might enable forest managers and haulage contractors to more effectively engage with regulators about the use of efficient haulage solutions.

The matrix in Table 2 presents a high-level analysis of the issues and opportunities identified through the interviews against potential and/or existing priority research themes. Green shaded cells indicate current Investment Plan focus. Orange shaded cells indicate potential areas for research identified by stakeholders.

Table 2: Relationship between industry issues and potential research themes

Potential research theme	Issues and opportunities				
	Labour capability and capacity	Increased haulage distance	Product utilisation and recovery	Supply chain data integration	Carbon emissions
Automation and robotics					
Big data management and supply chain metrics					
Training and re-training					
Electric and hydrogen vehicles					
Data collection and analysis					
Harvesting systems					
Pre-harvest determination of wood quality					

Stakeholders also identified the need for supply chain optimisation research projects to link with related projects in other Investment Plans and also those being funded under different arrangements, such as through the regional NIFPI⁴ Centres.

The challenge for improving the currency and effectiveness of the Plan is threefold. First there is a need to undertake a comprehensive discovery process to better understand what the supply chain value challenges and opportunities are at the operational level for individual enterprises and for discrete supply chains (characterised either by geography or product type or both). The discovery process will ideally provide a defensible method for quantifying current value metrics and benchmarks and then quantifying potential gains, as a means of determining relative value of research interventions. This discovery process would also examine what other research and operational trial work is current in Australia. As an example of this, while there is work identified to consider management and extraction of non-log residual fibre, at least one and possibly more growers are progressing work in this area under enterprise specific programs.

Second, there is a need to more clearly identify the information, research and data gaps related to those issues. This requires deeper engagement with the entire supply chain, including harvest and haulage services and timber processors, as well as equipment manufacturers and enterprises involved in system development and deployment.

Finally, more clearly defined research topics and projects need to be developed with realistic timeframes and explicit deliverables, which align with the identified priorities and clearly provide an indication of the value gains to be realised within a timeframe.

Anticipated changes in the supply chain optimisation field over the next decade

There is a clear recognition that the development of systems, technology and capacity for data flow and integration is occurring rapidly. Forest growers, harvest and haul service providers and timber processors are all actively engaged in identifying, developing and implementing systems and technology to capitalise on developments. Manufacturers and technical service and system

⁴ National Institute for Forest Products Innovation

providers are also responding rapidly to these needs and developments with new equipment and systems. The challenge for redevelopment of the Investment Plan is to assist growers and supply chain actors to identify which of these developments is suitable and can support supply chain value gains.

Table 2 shows the key priority areas identified by growers during consultation and nominated for implementation in the next five years.

Table 2: Key priorities for RD&E projects for the next five years, based on grower stakeholder consultation

Priority topic code	Research theme	Research sub-topic	Priority
SCO 5.1.1	Automation and robotics	Identification of supply chain activities most suited to automation and robotics.	Unrated
SCO 5.1.2		Detailed cost-benefit analysis of automation and robotics for specific supply chain activities.	Unrated
SCO 5.1.3		Development of priorities for automation and robotics.	Unrated
SCO 5.1.4		Targeted research based on the priorities.	Unrated
SCO 6.1.1	Big data management and supply chain metrics	Detailed mapping of specific regional and sectoral supply chains and clear identification of points of challenge and opportunity. Include supply chain valuation and benchmarking to facilitate clear identification of potential savings and gains against.	Unrated
SCO 6.1.2		Broad industry consultation (growers, harvest and haul sector, equipment manufacturers and processors) within those supply chains to identify specific metrics that can assist supply chain actors with introducing operational cost savings and supply chain value gains.	Unrated
SCO 7.1.1	Training and retraining	Discrete project to identify priority fields and disciplines for training and re-training and methods, techniques and approaches to delivering training, aligned with research priorities.	Unrated
SCO 8.1.1	Haulage	Discrete project to research and document the advantages of high performance vehicles in regions characterised by challenging topography and regulatory resistance (e.g. Tasmania, Central West NSW, Gippsland, Murray Valley).	Unrated
SCO 8.1.2		Discrete project to look at potential solutions for electric and/or hydrogen powered vehicles. Select a specific region (Green Triangle).	Unrated
SCO 8.1.3		Project or projects to look at specific opportunities to improve haulage configurations to assist with increased haul distances and costs. Include detailed look at what specific enterprises are doing in this space.	Unrated
SCO 8.1.4		Project looking at autonomous vehicles and potential application.	Unrated
SCO 9.1.1	Data collection and analysis	Review current priorities and develop clearer, more targeted projects aligned with the supply chain mapping requirements.	Unrated
SCO 9.1.2		Discrete project(s) to identify tree level data priorities for growers in discrete supply chains, including wood quality and wood property data.	Unrated

Tree level data capture

This is an area where 2020 Investment Plan activities are currently focused. Its importance and the need to maintain and enhance this focus was a key priority for interviewees.

Data capture methods and systems: forest inventory is rapidly changing. Historically it has involved labour intensive, plot-based representative sampling to observe and model the external characteristics of trees and logs in a forest. In the future it will involve minimal labour inputs and intense technological inputs (remote sensing, scanners, sensors and wood quality tools such as RESI) to collect large amounts of data about both the external and internal characteristics of every tree, with the potential to create a digital twin of the forest which can be subject to a much greater degree of scrutiny and analysis ahead of management intervention decisions. Added to this is the possibility of in-field segregation and capture and transfer of tree and log level data from the stump through the supply chain to the point of processing. Some interviewees pointed to the development

of cheap and efficient data capture methods, such as apps, that have been developed for application in log export operations that may provide quick and effective solutions for this in-field data capture.

Information captured: An important focus for interviewees is to define the type of tree level information that needs to be captured in order to capitalise on emerging technology to deliver supply chain value gains. Historically tree and log form has been described in detail based on visual observation. There is now a focus on wood properties and wood quality that can better inform cutting strategies, segregation and distribution. The challenge is to identify what data is most important to capture and focus on that. For example, is it important to know the placement and wood quality characteristics of every tree for a pulpwood harvesting operation? Again, understanding the requirements of individual enterprises and discrete supply chains will be important in defining this.

Application of tree level data: the application of tree level data has potentially very significant implications for value recovery (ensuring that the right fibre ends up in the right place to maximise value) and operational costs (for example targeting thinning operations to the right trees, or minimising wasted haulage space).

Future of wood manufacturing and markets

Developments in wood processing and manufacturing could see dramatic changes in the way that fibre is used to produce solid wood products and which fibre gets used. Currently, the vast majority of plantation solid wood is manufactured into frames and trusses. There is future potential for residential construction to be dominated by manufactured panels that have greater engineering consistency and stability, among other benefits. If this shift was to occur, it could have significant implications for the way that plantation supply chains work. For example, in-field chipping could become much more common for softwood plantations. There is an identified need to understand if, how and when this market shift might occur.

Labour market capacity and capability

The availability of labour and the skills and capability of that labour are a key focus for the entire supply chain. That has implications for a wide range of research areas, including the need for increased automation and robotics, remote data collection and so forth. There is also a safety element, with growers increasingly looking to minimise human interactions with trees and machines. A key focus is training for new industry entrants and re-training for existing employees in line with emerging technology and systems developments.

Automation and robotics

Automation and robotics were consistently identified by growers as a focus for future forest management activities, from establishment to haulage. There is a view that, as well as dealing with safety and quality issues and labour limitations, automation has the potential to deliver considerable cost savings. Significant costs are incurred in undertaking first thinnings, which is routine, repetitive work (removing a defined outrow) and in flat conditions in some regions. If this could be automated and deliver up to 10% in operational costs savings, that would be significant.

Implications of increased haul distances

Prior to the 2019/20 fire season and the supply chain disruptions associated with COVID-19, it was accepted wisdom that an average weighted haul distance should be a maximum of between 70 and 100 km. In a very short period of time it has become normal to see log haulage distances up to 800 km. This presents a significant opportunity for identifying and implementing supply chain efficiencies, including through truck configurations, back-haul configurations, autonomous vehicles

and electric or hydrogen powered vehicles. The latter also present opportunities for supply chain actors that are looking to deal with carbon emissions issues.

Residues and waste

A number of growers interviewed have identified the need for more research focused on how to extract and transport non-log residues from the forest to emerging markets such as biomass energy and biochar. While there are environmental issues (soil conservation and nutrition) that also need to be addressed if this practice is to increase there are significant emerging market opportunities that are hampered by the absence of developed efficient systems to collect and transport these products.