MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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Forest Economic Advisors

MBIE SPOTLIGHT PAPER

Forest Economic Advisors LLC ("FEA"), a US-based forestry consulting company, has been engaged by the Ministry of Business Innovation and Employment ("MBIE") to provide an overview paper on the NZ forestry and forest products sector including a series of brief Spotlight Papers targeting a key theme. The theme of this Spotlight Paper is…

Can New Zealand be internationally competitive in selling sawn timber into the Chinese market?

1.0 Introduction

New Zealand is currently the largest supplier of softwood logs into the Chinese market as shown in Figure 1. From a total volume of 38.102 million cubic meters (m^3) of logs imported to China in 2017, NZ supplied 14.056 million m^3 or just under 37% of the total.

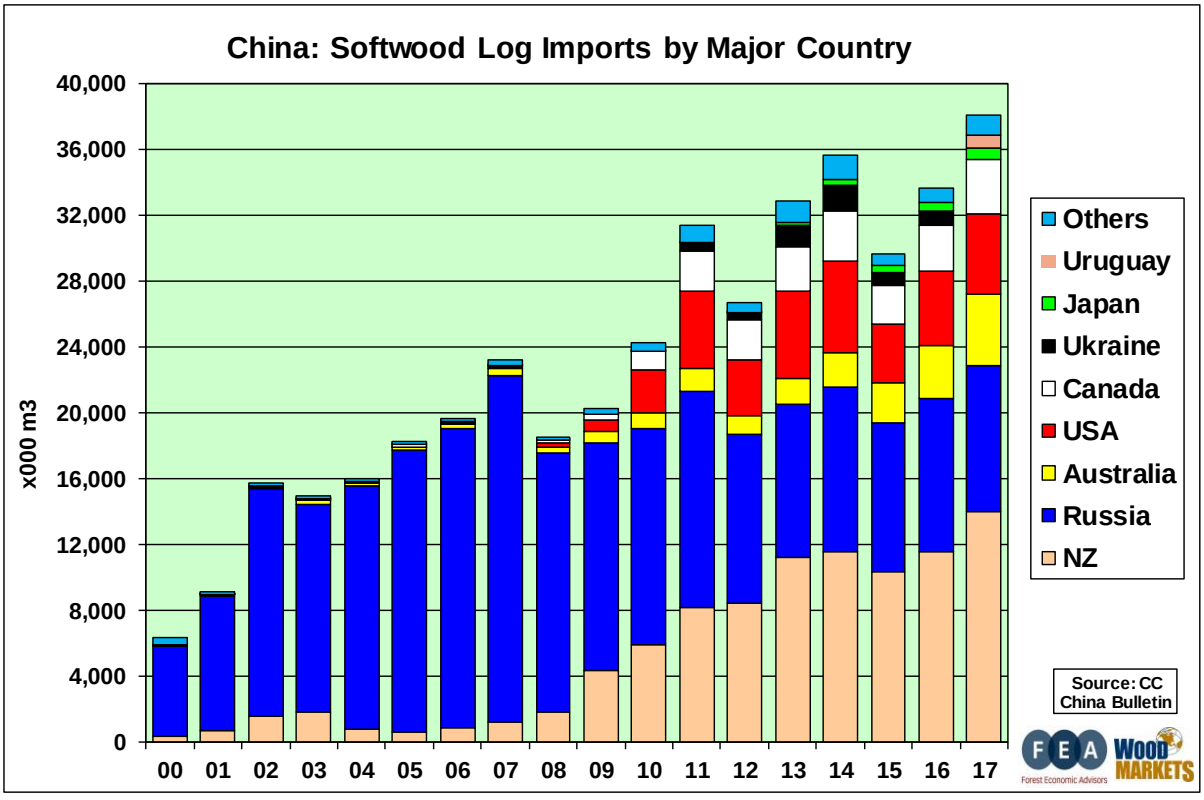

Figure 1. Softwood log imports into China by major country

Figure 2 shows total global softwood sawn timber imports by country. The USA and China are the two largest importers contributing about 43% of global sawn timber imports in 2016.

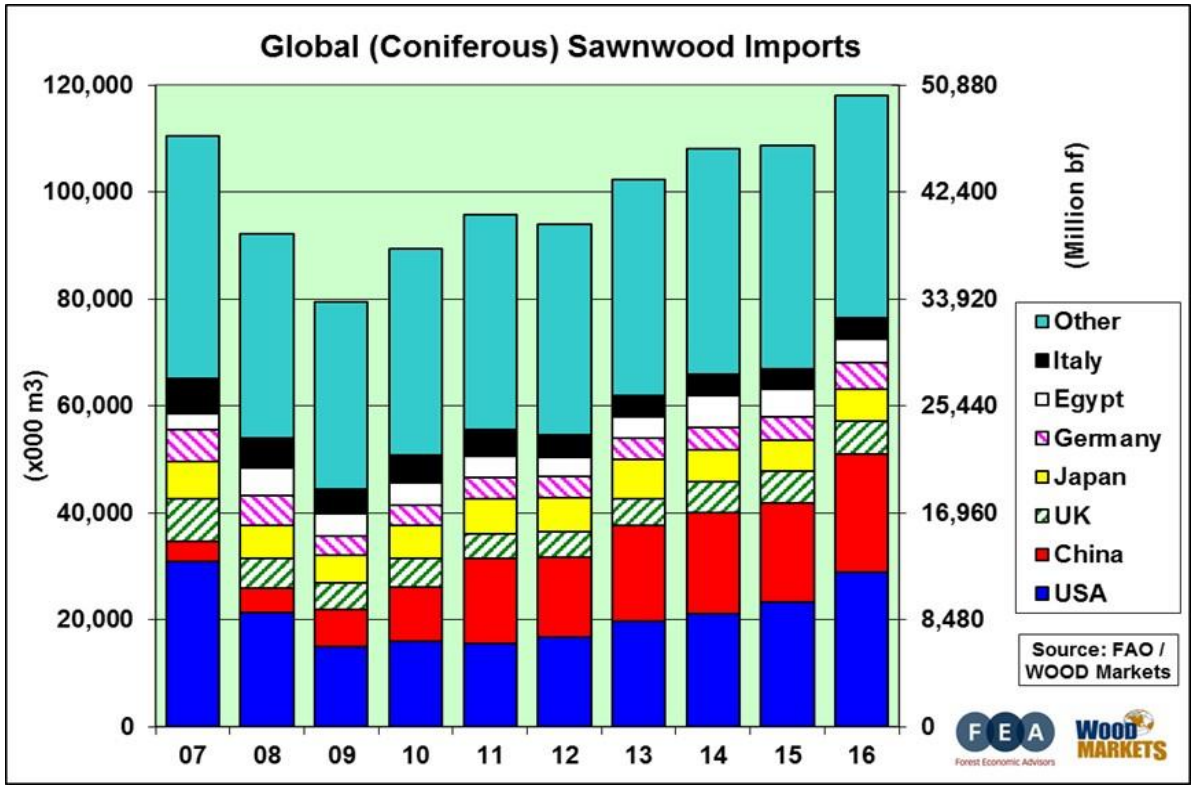

Figure 2. Total softwood sawn timber imports by country

Figure 3 shows total softwood sawn timber imports by country into China. In 2017, Russia (14.284 million m^3) and Canada (4.997 m^3) are the two largest exporters with a combined share of 77% of total Chinese softwood sawn timber imports. By contrast New Zealand exported only 0.427 million m^3 of sawn timber or just 1.7% of Chinese softwood sawn timber imports.

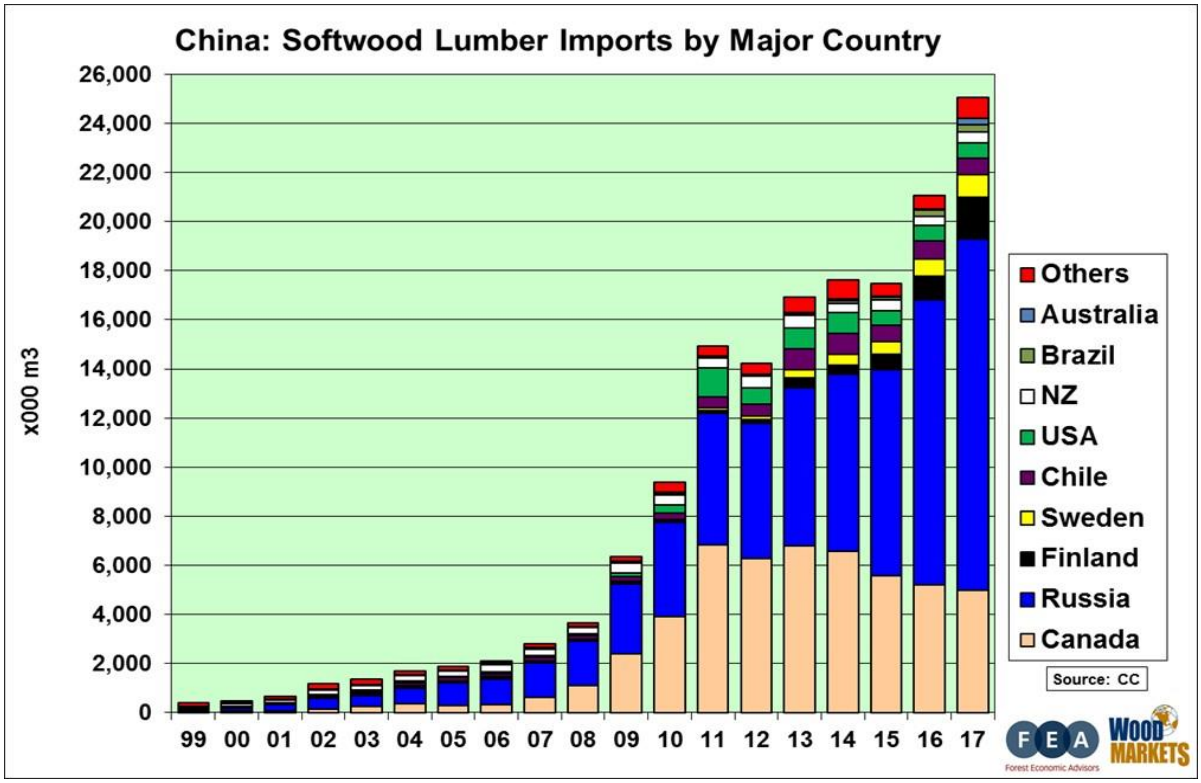

Figure 3. Softwood sawn timber imports into China by major country

To recap the key points:

- China is the second largest global softwood sawn timber importer, behind the USA, importing **25 million m^3** of softwood sawn timber in 2017.
- Of this, China imported just over **0.4 million m^3** from New Zealand which equates to about 1.7% of total Chinese softwood sawn timber imports.
- China imported **38 million m^3** of softwood logs in 2017.
- New Zealand contributed **14 million m^3** or 37% of total softwood log imports to China.

This is an extremely significant imbalance. From a regional economic development and job creation perspective, New Zealand should be processing more of these logs domestically and exporting the sawn timber to China. This Spotlight Paper considers whether competitiveness is one possible factor preventing this from occurring. Can New Zealand be internationally competitive in selling sawn timber into the Chinese market?

2.0 New Zealand Sawmilling Industry

Radiata pine forests are grown as either a pruned (direct sawlog) or structural regime as shown in Figure 4.

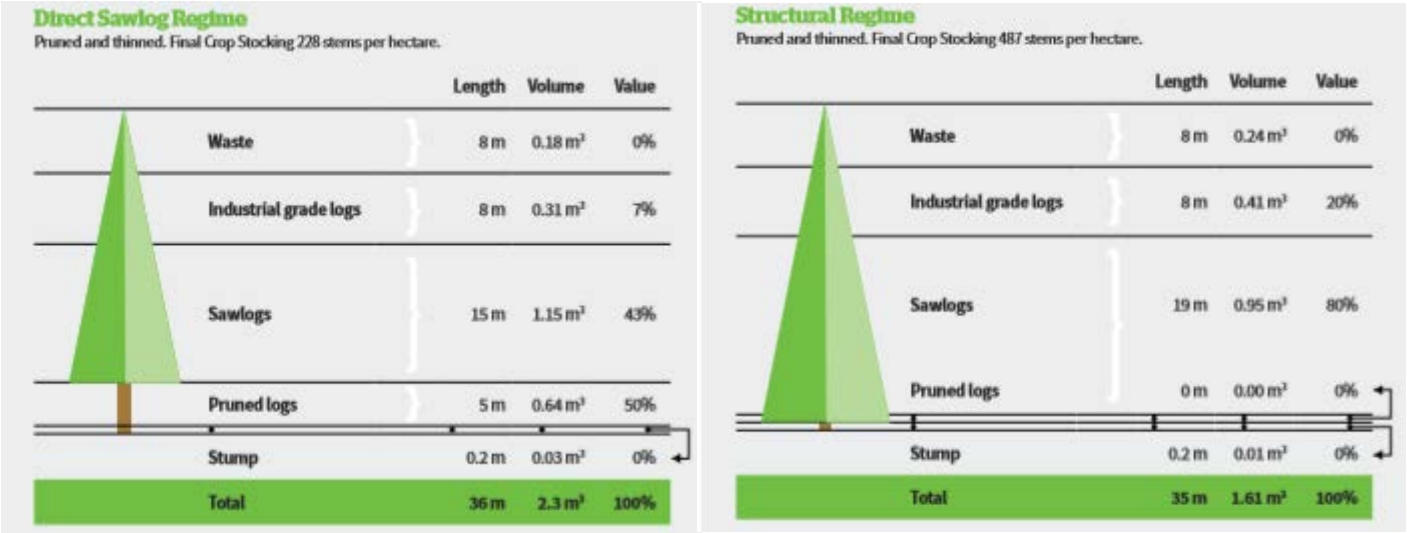

Figure 4. Typical sawlog out-turn for pruned and structural regimes

Source: Forest Owners Association Facts & Figures 2016 Booklet (pg 21) from www.nzfoa.org.nz

The tree "stem" is made into a range of logs either in the forest or at a centralised log yard or processing plant. The bottommost log from either regime is the most desirable (pruned sawlog for appearance sawmills or high-density structural sawlog for framing timber sawmills). Log quality deteriorates up the tree stem and results in a mid-range category known as utility-grade logs that are referred to historically as A and K-grade logs. It is these utility-grade logs that make up the bulk of the 14 million m^3 sent to China in 2017. These utility-grade logs do not yield the high proportion of valuable clearwood (as comes from a pruned log) or valuable framing timber (as comes from a high-density sawlog). This has led to the perception in the industry that it is almost impossible for a sawmill to run profitably on a log diet of 100% utility-grade logs as there is insufficient value recovery to justify the log price. There is only one sawmill recognised as doing that in New Zealand currently – Sequal Lumber in Kawerau with a focus on custom cutting timber to customer sizes as opposed to industry standard dimensions.

3.0 Cost Competitiveness

FEA has recently completed a global study on the cost competitiveness of the sawmilling industry by region[1]. The data covered the period to Q2 2017. This study looked at "average" sawmills in a region as well as "top quartile" or "best" sawmills.

Figure 5 below shows the analysis for three categories of softwood sawn timber, kiln-dried, from various regions as "net" wood in m^3 delivered in US$ to Shanghai on a C&F basis as follows:

1. SPF (spruce/pine/fir) mixed species from North America
2. European Spruce from a range of European countries
3. Radiata Pine (or plantation pine) from four key producing countries (as shown).

Net wood costs are a measure that account for the cost of the log delivered to the sawmill; the sawmill yield (how much is converted to saleable timber versus mill "residues" such as chips and sawdust); less the value recovered from selling the residues. It measures the wood cost in the final timber product on a net converted basis (as opposed to simply log cost delivered to the mill).

Sawmill Costs + OH (overhead) are the actual cash costs to operate the sawmill including sales and marketing costs.

Freight and Logistics Costs include delivery of lumber from the millgate to the port (truck and/or rail), all port handling charges (including stuffing of containers) and the ocean shipping costs (typically on a FEU container basis) if not delivered overland, i.e. from some European countries.

These three components give an effective total cost measure for the Top Quartile or Best sawmill by region and show the predicted margin return to the respective selling price of the product. For Radiata Pine, this is a Furniture Grade PF COL (Pith-Free, Cut Of Log) selling at around US$260/$m^3$ in Q2 2017.

Figure 5. Delivered sawn timber costs to Shanghai (C&F basis) for top quartile or best sawmills

[1] 8th Biennial Cost Benchmarking Report for 2016 Annual and 2017/Q2

The New Zealand data is compelling for two very obvious reasons:

1. Net wood costs at just under US$150/m^3 are the highest of all the regions, not just for the Radiata pine producing regions. This is largely the result of forest owners in New Zealand selling logs at "export parity" pricing to domestic sawmills. Effectively, Chinese log buyers are setting the market price for NZ sawmills.
2. The sawn wood selling price is below the predicted sawmill EBITDA.

It is important to point out that the New Zealand sawmills will be making money on their premium products, i.e. clearwood for appearance sawmills and framing timber for structural sawmills. For these sawmills, the PF COL timber is essentially a downfall grade generated as part of their overall product mix. The sawmill will be prepared to take a loss to "quit" this wood and maintain their cashflow.

As a consequence of sawmillers having to deal with these grades at these prices, there is a belief that without any offsetting premium priced products in the output grade mix, it would not be possible to process profitably just A and K-grade logs. The counter-argument to this is that these are brownfield, older sawmills that were never designed and built to process a log diet of 100% A and K grade logs. What would an absolute best-case scenario look like for a purpose-built, state-of-the art, greenfield sawmill designed to run 100% A-grade logs and produce only PF COL timber for the Chinese furniture market?

4.0 Cost Structure and Competitiveness of Dedicated, Greenfield A-grade Sawmill

As part of a related piece of work, FEA has been involved in the analysis of a greenfield sawmill dedicated to processing 400,000 tonnes/year of only A-grade logs into PF COL product for the Chinese market. The sawmill was assumed to be in the central North Island operating on geothermal energy. To calculate the EDITDA in US$/m^3, an exchange rate ratio of US$:NZ$ = 0.70 was used. One JAS m^3 was assumed to be equal to one tonne (per convention used by the Ministry of Primary Industries[2]).

> Net wood costs were calculated at **US$153/m^3** based on:

- A current A-grade log price = NZ$140/ JAS m^3 delivered to the millgate (export parity price)
- A yield of 57% of saleable timber = 228,000 m^3 based on 400,000 tonnes per year log in
- 92,000 tonnes of chip sold at NZ$60/tonne
- 60,000 tonnes of sawdust sold at NZ$10/tonne.

So, net wood costs = [0.7 x (400,000 x 140)] – [(92,000 x 60) + (60,000 x 10)] / 228,000 = US$153/m^3.

> Sawmill Costs + OH were calculated at **US$38/m^3** based on:

- Mill running on a 5-day, 2 x 9-hour shift operation with 12 people per shift
- Utility costs (geothermal, electricity) provided by a stakeholder energy company
- Leased land (25 hectares)
- Industry estimates of packaging costs and maintenance consumables
- OH cost based on FEA benchmarking at US$11/m^3 (includes management salaries).

> Logistic costs were calculated at **US$30/m^3** based on:

- current rates to truck the timber from millgate to the Port of Tauranga
- stuff 40 m^3 of timber into an FEU container
- ship the FEU container on a C&F basis to Shanghai.

Combining the above gives total costs of **US$221/m^3** (delivered sawnwood costs to Shanghai port)

[2] http://www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-product-markets/

All costs above are as at June 2018. The price for Radiata Pine Furniture Grade, PF COL, C&F at June 2018 is US$280/m^3. Figure 6 shows this "Best" NZ sawmill compared with the Radiata-producing mills in Q2 2017 (from Figure 5 above).

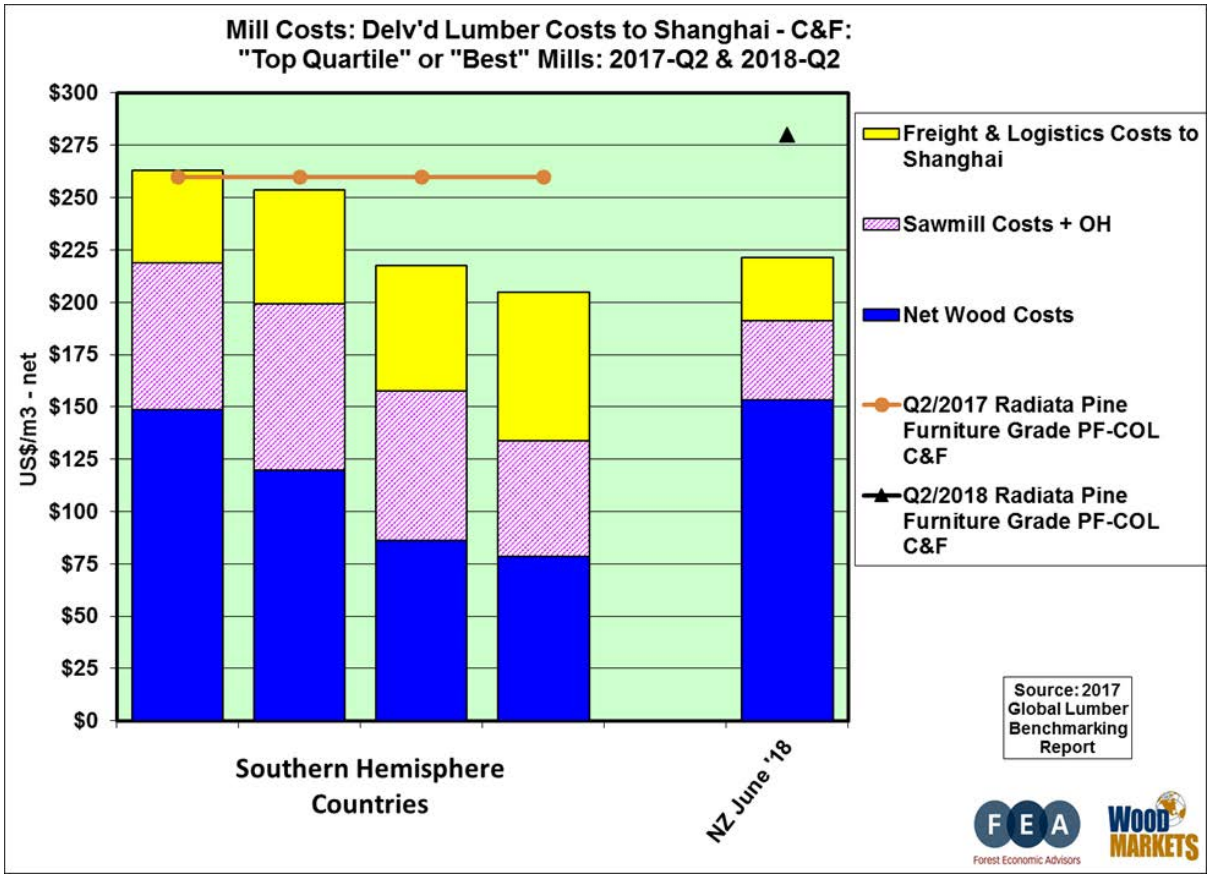

Figure 6. Delivered sawn timber costs to Shanghai (C&F basis) including NZ Best Mill

Figure 6 shows that the total costs (US$/m^3 – net) for the NZ Best sawmill **are now competitive with other Southern Hemisphere mills** selling Radiata Pine Furniture Grade, PF COL on a C&F Shanghai port basis.

However, for the NZ Best sawmill:

- the Sawmill Costs + OH at US$38/m^3 are **equal to world's best** as seen in some of the European producing regions operating on European Spruce (compare to pink hatched bars in Figure 5)
- The total logistics costs from Taupo to Shanghai through the Port of Tauranga at US$30/m^3 are **absolute best in the world** (compare to yellow bars in Figure 5).

The EBITDA margin and resulting cashflow is sufficient to yield an **acceptable return on investment** for the NZ sawmill based on initial high-level financial modelling with all sawn timber product sold in China. An IRR of around 15% and a payback of 6-7 years is achievable on a conservative total capital investment of US$60 million (includes earthworks, civil, infrastructure, plant/equipment and commissioning).

5.0 Cost Competitiveness with Chinese Domestic Processing

FEA benchmarking analysis has been used to compare how the Best NZ sawmill competes with a typical Chinese sawmill. To ensure that all costs (and potential differentials) are equitably accounted for, this requires the comparison to be made based on delivered sawn wood costs to the wholesale market in Shanghai.

For processing in New Zealand, the C&F analysis in Section 4.0 above is extended to include:

- VAT at 16% on lumber imported into China (C&F) at **US$44/m^3**
- Port and logistics costs at **US$26/m^3** including:
  - China port fee/customs
  - Letter of Credit charges
  - Importer margin
- Delivery to wholesale market costs of **US$10/m^3** including:
  - Truck to wholesale market
  - Wholesaler margin

This gives the total delivered cost to the lumber wholesaler at **US$301/m^3**.

For processing in China, the following is assumed:

- Same A-grade log at NZ$142/m^3 delivered to the Port of Tauranga ($2/m^3 higher due to cartage differential when delivered to NZ sawmill gate)
- Logs delivered to Shanghai at **US$145/m^3** (C&F basis)
- VAT at 10% on logs imported into China (C&F)
- Total delivered log costs to China sawmill of **US$187/m^3** including:
  - Fumigation
  - China port fee/customs
  - Letter of Credit charges
  - Importer margin
  - Truck to log yard
  - Log rescaling
  - Credit on log scale conversion
  - Truck to sawmill
- Net wood costs of **US$244/m^3** based on:
  - Delivered log cost of US$187/m^3 (from above)
  - 70% yield
  - Residue recoveries of US$23/m^3 (FEA analysis)
- Sawmill Costs + OH were calculated at **US$47/m^3** including kiln drying (FEA analysis)
- Delivery to wholesale market costs of **US$8/m^3** including:
  - Truck to wholesale market
  - Wholesaler margin

This gives the total delivered cost to the lumber wholesale market at **US$299/m^3**.

Note that the Chinese supply chain is typically much more disaggregated with logs sawn in small band mills and the green boards handled/trucked to a separate location for kiln drying, then handled/trucked again to the furniture factory.

Interestingly the two numbers above are almost identical showing that the **NZ Best sawmill can compete with domestic Chinese processing of a similar A-grade log**.

Furthermore, the NZ sawn timber will be of **better quality** due to tighter sawing tolerances and no blue stain contamination (can be problematic with imported logs) as well as the generally poorer levels of kiln drying seen in China.

The relative costs of the two scenarios are shown in Figure 7 with VAT charges broken out. The VAT differential between logs (10% on a log basis, C&F basis) and sawn timber (16% on a sawnwood basis, C&F basis) is significant at **US$23/m³**, net sawn wood basis.

This is based on VAT of **US$ 44/m³** for imported sawn wood compared to US$14.50/m³ for imported logs which converts to **US$21/m³** on a sawn wood basis.

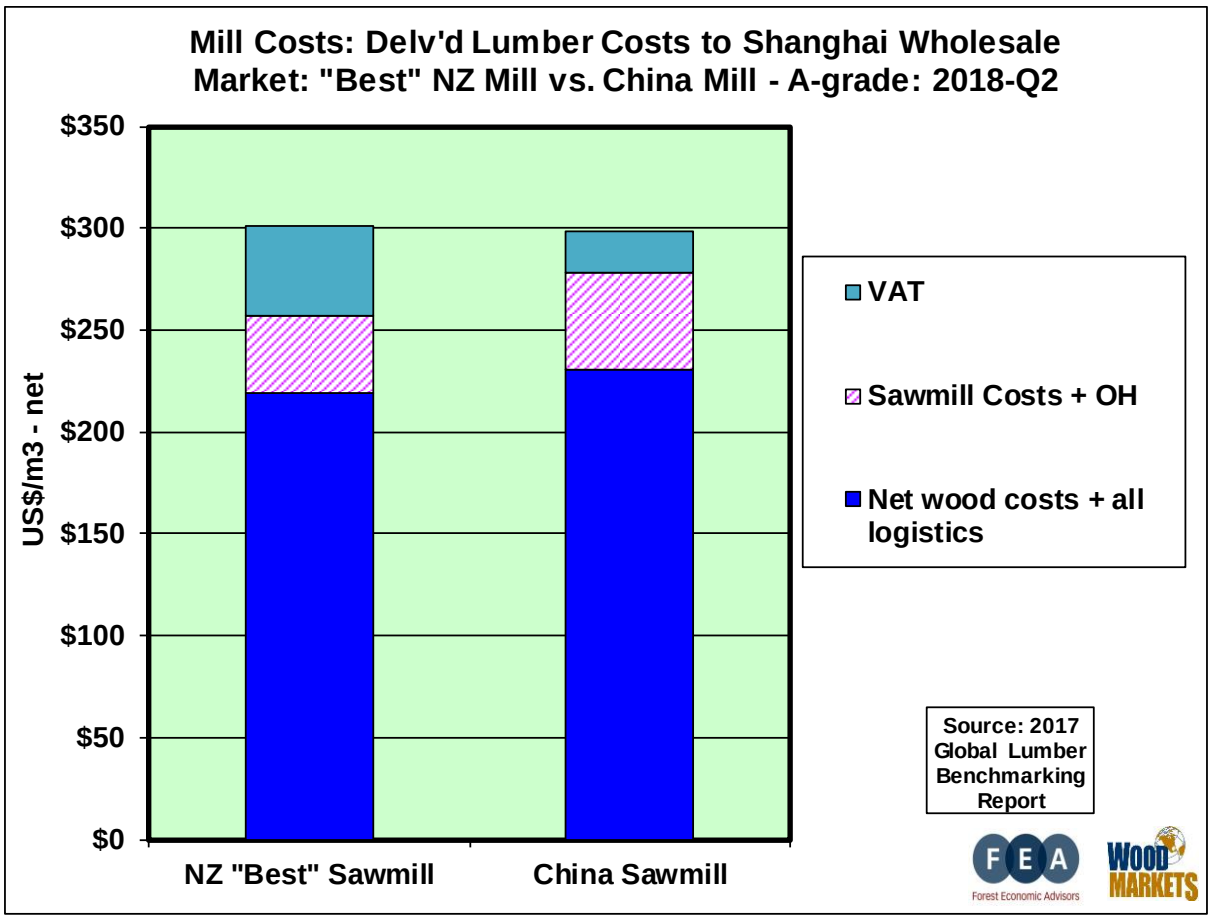

Figure 7. Delivered sawn timber costs to Shanghai wholesale market

6.0 Conclusions

This Spotlight Paper posed the question:

Can New Zealand be internationally competitive in selling sawn timber into the Chinese market?

The answer is "yes" but given New Zealand has the highest net wood costs of all regions supplying softwood sawn timber to China, it means there is little room for error. To compensate for the high domestic log prices, the NZ sawmill will have to have total production costs (operating and overhead) equal to the very best mills in Europe and North America and logistics costs that surpass every other region shipping sawn timber to Shanghai.

Indications are that these are achievable but will require as a minimum:

- guaranteed wood supply (at negotiated, market prices) from several forest owners on a long-term basis;
- a location that allows sawn timber product to be sent through world-class port operations e.g. Port of Tauranga - arguably the most efficient forestry port in the world;
- committed support from an energy provider supplying land (for lease), geothermal energy and electricity at attractive rates; and
- an unsurpassed relationship with the plant and equipment suppliers to guarantee the operability of the plant in terms of manning numbers and yield as well as no "blow-outs" in capital cost.

In terms of comparing New Zealand with Chinese sawmilling, it is important for the New Zealand government to note that the VAT differential on logs versus lumber is critical. It artificially helps the Chinese sawmilling industry maintain competitiveness versus a New Zealand operation where even Top Quartile performance is not enough. Absolute world-best performance is required for the New Zealand sawmill operation just to maintain parity with their Chinese counterparts given this VAT differential!

New Zealand's open economy has created something of a "double whammy" effect in that the Chinese are benefitting from New Zealand being their largest softwood log supplier (37% of total softwood log imports in 2017) but this has the effect of driving up log prices for the domestic New Zealand sawmills. These sawmills then face a 6% VAT differential between logs and sawn timber that makes it difficult for them to compete. Since the log VAT is on a lower valued product, this value differential applied to logs versus lumber is much greater – in the example above it is about US$23/m^3 on a sawn wood basis.

More tellingly, other regions that supply significantly lower log volumes to China (i.e. not doing the Chinese sawmilling industry any favours) are paying the same 16% VAT on their imported sawn timber.

It seems unlikely that the Chinese government will want to reduce the logs to sawn timber VAT differential given the competitive protection it offers their domestic sawmilling industry. However, a more reasonable option may be to have a VAT scale for imported sawn timber that reflects, more equitably, the willingness of a country to supply China with logs and support their domestic sawmilling industry.

For a country like New Zealand, the only other alternative is to impose some form of log export tax on logs as Russia did in 2008 to great effect for its own domestic sawmilling sector. However, this is a fairly "blunt" instrument inconsistent with New Zealand's open trade policy. A better approach may be to play the "fairness card" under the New Zealand-China FTA and try and negotiate a special sawn timber VAT for New Zealand recognising our importance as a softwood log exporter to China and the detriment this is having on the competitiveness of our own domestic sawmilling sector (including the flow-on effects to residue users like the pulp and paper sector where chip shortages are limiting growth prospects e.g. Oji Fibre Solutions mills at Kinleith and Kawerau).