

IMPORT COSTS AND OVERSEAS EARNINGS OF AFFORESTATION MODELS FOR THE EXPORT LOG TRADE

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ABSTRACT

Results of afforesting land of three site indices, 80, 95, and 110 with radiata pine (*Pinus radiata* D. Don) are evaluated at interest rates of 3% to 14% in terms of export dollars earned by sale of logs per import dollar. Customs duty is excluded. At 7% interest rate, results for the three site indices are 8.2, 9.9, and 10.7 export dollars per import dollar, if social costs of roading and accommodation are included; these figures rise to 9.6, 11.2, and 11.9 respectively if social costs are excluded.

At 7% interest rate imports comprise 15%, 16%, and 17% of total costs for site indices 80, 95, and 110 respectively. Logging is overwhelmingly the most important forest import-dollar cost, at interest rates up to 13% on all site indices.

Results are sensitive to yields and export prices.

Location affects results and further studies should be made on a free-at shipside and free-on-board basis.

INTRODUCTION

The profitability of afforestation for export log production has been calculated for three site qualities (Fenton and Tustin, 1972; Fenton and Dick, 1972a, 1972b). These profitability studies assessed results in terms of standard criteria—using the internal rate of return (IRR); land expectation values (LEV) which are discounted present net worths (PNW) per acre; together with schedules of the labour and land needed.

In its report to the New Zealand Government on the country's economy the World Bank Economic Advisory Mission recommended:

"Well-defined criteria should . . . be established by the Government for priorities of development in the major sectors in order to encourage those activities in which New Zealand has a comparative advantage. An appropriate indicator of the comparative advantage could be the domestic costs per unit

of foreign exchange saved by imports substitution or earned by exports.” (Anon., 1968, p.14.)

This paper accordingly evaluates the overseas exchange requirements and earnings of the afforestation models. A preliminary study (Fenton *et al.* 1969) for the Forest Development Conference has shown favourable ratios of export dollars earned per import dollar required for site index 95. The three site qualities studied here are of indexes (Lewis, 1954) 80, 95, and 110. Site quality 80 is characteristic of much of Nelson, 95 of the central North Island, and sites of 110—the highest quality site evaluated—are frequent in the Bay of Plenty.

The forest management used on the three site qualities has been detailed in the reports cited, and is not repeated here. Overall: land is afforested in under half the period of the normal rotation (*viz* in 11 yr if the trees are grown 23 yr); the end product required is two 39-ft-long logs to a 6-in. small-end diameter (*s.e.d.*) on 150 trees per acre; and the base year for costs and returns is early 1968.

IMPORT COSTS

Where possible the import content was calculated directly using information supplied by the New Zealand Forest Service, importers, and other agents. Where actual values were not available, as in the case of general items, administration, etc., the Inter-Industry Study of the New Zealand Economy, 1959-60 (Anon., 1966) was used, which gives the average import content for these items (albeit pre-devaluation).

Forestry projects, whether State or private, all pay import duty and/or sales tax on equipment and supplies purchased. The Inter-Industry Study (Anon., 1966) includes indirect taxes as one of the primary input coefficients for final demand; so the import coefficients as used in this analysis reflect any taxes and duties payable. Where the import content was obtained directly from the agents (and this covers virtually all the costly equipment) this comprises cost, insurance, and freight, but not customs duty. (The total costs used in the earlier papers include the duty and sales taxes which are payable).

The proportions of import costs of direct forest operations are summarised in Table 1; further details of their origin are in Appendix 1 (these figures exclude gang-truck costs, which are included elsewhere under vehicles). Overseas costs of direct forest operations are low, as the biggest cost component is usually labour.

TABLE 1—Import components of direct forest operations costs

Item	% of Total Cost	Amount (cents/acre)
Land clearing	14	57
Machine planting	4	40
Thinning to waste	3.26	72.4
Aerial seeding	1.1	11.2

Import costs in forest protection are summarised in Table 2, and further details given in Appendix 2. Again, import costs are low.

TABLE 2—Import components of protection costs

Item	Import Capital Cost \$	Service life yr	Import % of total	Annual Running Costs (\$)			
				R & M	Fuel	Tyres	Total
Fire							
Fire engine	3,100	10	30	33	6	5	44
Tanker	790	10	22	10	6	5	21
Pumps	120	10	10				
Radio							
Miscellaneous equipment	460	10	10				
Firebreak preparation				40 per yr for 10 yr			
Lookout	510	65	9.3				6
Garage and store	410	65	9.3				5
Telephone lines	114		9.3				
<u>Dothistroma</u>							
Aerial survey	0.0015		15				
Spraying	0.55		18.25				

R & M = repairs and maintenance

The import cost proportions of charges for accommodation; for roading; for administrative buildings; and miscellaneous charges are given in Table 3, and their origins in Appendix 3.

The import cost proportions of logging and vehicles are given in Table 4, and their origins in Appendix 4. These are the most important components of the overseas costs at all interest rates of all site qualities (except site index 80 at 14% interest rate).

The original Treasury directive was to exclude the import cost of labour; and to include social costs. The latter comprise roading and accommodation.

The PNW has usually been employed in forestry for the last 130 yr or so as the LEV, which is PNW per acre. The LEV equivalents of direct, protection, social, and logging import costs are given in Table 5 for the three site indexes; they are based on full breakdowns—ranging from 70 to 100 items—for each site index. The proportions of the total import costs are given in Table 6.

The treatment of charges for the relatively minor items of stores has differed from current Government accounting. In present accounting these items are costed out to the job under the appropriate administrative charge. For this economic analysis they have been allocated a service life to allow their replacement to be costed periodically. This was considered preferable to attempting to allocate the proportion of import costs in, for example, such broad charges as "general administration". The amounts involved are, in any case, trivial.

TABLE 3—Import components of accommodation, roading, and administrative costs.

Item	Import Capital Cost	Import % of Total	Service Life	Annual Cost
	\$		yr	
A. Accommodation				% of R & M
Houses (each)	924	11	65	11
Huts (each)	77	11	20	11
Caterer's house	737	11	65	11
Cookhouse	3,047	11	40	11
Ablution block	979	11	40	11
Share of "services"	1,248	9.3		
Services N.E.I.	1,460	9.3		
Water supply	562	9.3		
Site preparation	770	9.3		
B. Roading				\$
Grader	17,000	85	10	376
Tip-truck	1,470	32.7	10	153
10-cwt truck	1,070	53.5	10	71
C. Administrative				% of R & M
Office, oil store, garage	7,607	14.6	40	14.6
Class 'A' stores	2,720	10	5	
Miscellaneous stores	460	10	10	
Services & general, R & M	6,240	9.3		
Water supply	562	9.3		
Telephone	114	9.3		

R & M = repairs and maintenance

N.E.I. = not elsewhere indicated

TABLE 4—Import components of equipment and vehicle costs

Item	Import Capital Cost	Service Life	Import % of Total Cost	Annual Running Costs (\$)			
	\$	yr		R & M	Fuel	Tyres	Total
Logging							
Tractors	29,300	6	83.7	605	292	-	897
Logging arch	1,100	10	22.0	44	-	-	44
Loaders	29,000	10	82.9	410	149	26	585
Gang trucks	1,070	10	21.5	31	55	13	99
Power saws	100	2	66.7	31	35	-	66
Field service units	1,500	10	30.0	60	82	8	150
Miscellaneous equipment	460	10	10.0				
Miscellaneous stores	500	3	10.0				
General Vehicles							
HD6 tractor	12,000	6	90.6	412	121	-	533
Tip trucks	1,470	10	32.7	45	82	26	153
10-cwt trucks	1,070	10	53.5	20	38	13	71
Car	880	10	35.2	14	38	8	60
Trekka truck	1,000	10	56.5	13	31	11	55

R & M = repairs and maintenance

TABLE 5—Discounted import costs per acre (LEV) by operations

	Interest Rate %											
	3	4	5	6	7	8	9	10	11	12	13	14
	LEV in cents/acre											
Site Index 80												
Land clearing, establishment & tending	103	83	71	63	57	52	48	45	42	40	38	36
Protection	248	188	152	127	109	96	85	76	68	61	56	52
Administration	668	502	404	338	293	259	233	212	194	178	166	154
Logging	5,451	3,353	2,199	1,503	1,058	760	554	413	309	233	173	143
Subtotal	6,470	4,126	2,826	2,031	1,517	1,167	920	746	613	512	433	385
% of total costs*	18.7	18.0	17.2	16.4	15.6	14.8	14.0	13.4	12.7	12.0	11.4	11.3
Social	547	420	342	292	255	226	204	186	170	157	146	137
% of total cost including social costs*	18.2	17.5	16.8	16.0	15.3	14.5	13.9	13.3	12.8	12.2	11.8	11.6
Site Index 95												
Land clearing, establishment & tending	128	103	88	77	69	63	59	55	51	48	46	44
Protection	291	221	178	149	128	112	99	89	80	72	66	61
Administration	729	545	438	366	317	278	250	226	209	191	177	164
Logging	7,249	4,646	3,186	2,279	1,680	1,263	968	750	585	462	372	304
Subtotal	8,397	5,515	3,890	2,871	2,194	1,716	1,376	1,120	925	773	661	573
% of total costs*	19.0	18.6	18.1	17.5	17.0	16.3	15.7	15.1	14.5	13.8	13.4	12.9
Social	601	465	382	327	288	256	232	212	194	180	168	158
% of total costs including social costs*	18.5	18.0	17.4	16.9	16.3	15.7	15.2	14.6	14.0	13.5	13.1	12.7
Site Index 110												
Land clearing, establishment & tending	148	119	101	88	79	72	66	62	58	54	51	48
Protection	318	240	193	161	137	120	106	94	85	76	70	64
Administration	730	550	443	372	323	286	256	232	214	197	184	172
Logging	8,472	5,538	3,879	2,839	2,145	1,656	1,302	1,037	834	678	575	511
Subtotal	9,668	6,447	4,616	3,460	2,684	2,134	1,730	1,425	1,191	1,005	880	795
% of total costs*	19.0	18.7	18.3	17.9	17.5	17.1	16.6	16.2	15.7	15.2	15.1	15.1
Social	621	481	396	338	298	265	240	219	201	186	173	163
% of total cost including social costs*	18.5	18.1	17.7	17.3	16.8	16.4	15.9	15.4	15.0	14.5	14.4	14.4

* Viz cost including import and domestic \$

RETURNS AND RESULTS

All logs produced and loaded on truck are deemed to be exported, hence the full LEV for returns have been used. These are given in Table 7. The number of export dollars earned per import dollar cost is given in Table 8. The export dollars earned per dollar of total (domestic plus import) cost are given in Table 9 (as all returns are deemed to be exported). (This gives the benefit/cost ratios of the projects, and as such has the disadvantages that are inherent in such ratios).

DISCUSSION OF THE RESULTS

Price Points — Location

The paper deals with forest growing, logging, and loading-on-truck, and the price point taken has been "loaded-on-truck at the mid-point of the forest". The evaluations have been made by assuming the forest is 90 miles from the port; the effect of location

TABLE 6—Percentages of the total import cost

Site	Cost type	Interest Rate %													
		3		5		7		8		10		12		14	
		Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs
110	Logging	82	88	77	84	72	80	69	78	63	73	57	67	53	64
	Administration	7	8	9	10	11	12	12	13	14	15	17	20	18	22
	Social	6	-	8	-	10	-	11	-	13	-	16	-	17	-
	Other	5	5	6	6	7	8	8	9	9	11	11	13	12	14
95	Logging	80	86	75	82	68	77	64	74	56	67	48	60	41	53
	Administration	8	9	10	11	13	14	14	16	17	20	20	25	22	29
	Social	7	-	9	-	12	-	13	-	16	-	19	-	22	-
	Other	5	5	6	7	8	9	9	10	11	13	13	15	14	18
80	Logging	78	84	69	78	60	70	55	65	44	55	35	45	27	37
	Administration	9	10	13	14	17	19	18	22	23	28	27	35	30	40
	Social	8	-	11	-	14	-	16	-	20	-	23	-	26	-
	Other	5	5	7	8	9	11	11	13	13	16	15	20	17	23

TABLE 7—Discounted export dollars earned per acre for the respective site indexes (SI)

Interest Rate %	SI 80	SI 95	SI 110
3	817	1,141	1,381
4	490	716	881
5	314	481	603
6	210	338	432
7	145	245	320
8	102	181	242
9	73	136	186
10	53	104	146
11	39	80	115
12	29	62	92
13	22	49	74
14	17	39	60

TABLE 8—Number of discounted export dollars earned per discounted import dollar spent for the respective site indexes (SI)

Interest Rate %	SI 80		SI 95		SI 110	
	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs	Incl. Social Costs	Excl. Social Costs
3	11.64	12.63	12.68	13.59	13.42	14.28
4	10.78	11.88	11.97	12.98	12.72	13.67
5	9.91	11.11	11.26	12.36	12.03	13.06
6	9.04	10.34	10.57	11.77	11.37	12.49
7	8.18	9.56	9.87	11.17	10.73	11.92
8	7.32	8.74	9.18	10.55	10.10	11.35
9	6.49	7.93	8.46	9.88	9.44	10.75
10	5.69	7.10	7.81	9.29	8.88	10.25
11	4.98	6.36	7.15	8.65	8.26	9.66
12	4.33	5.66	6.51	8.02	7.72	9.15
13	3.80	5.08	5.91	7.41	7.03	8.41
14	3.26	4.41	5.34	6.81	6.26	7.55

on overall profitability has been analysed (Fenton and Dick, 1972a, 1972b) and more favourable (nearer) locations considerably increase forest LEV. The export dollar earned by the forest criterion, being a ratio, is sharply increased by any saving in internal freight. For example, at 7% interest on site index 95, locating the forest 20 miles nearer the port increases the export dollars earned per acre by about 19, and this increment is sustained until the forest is 30 miles from the port. That is, a 60 miles more favourable location increases the number of export dollars earned by the forest by about 58. The export dollars earned per dollar of imports would then increase

TABLE 9—Export dollars earned per dollar of total cost
(loaded-on-truck basis, 90 miles from port)

Interest Rate %	Site Index (ft)					
	80		95		110	
	+ Social Costs	- Social Costs	+ Social Costs	- Social Costs	+ Social Costs	- Social Costs
3	2.12	2.36	2.34	2.59	2.48	2.72
4	1.89	2.14	2.15	2.41	2.30	2.56
5	1.66	1.92	1.97	2.24	2.13	2.40
6	1.45	1.70	1.78	2.06	1.96	2.24
7	1.25	1.49	1.61	1.89	1.80	2.09
8	1.06	1.30	1.44	1.72	1.65	1.94
9		1.12	1.28	1.56	1.50	1.80
10			1.14	1.40	1.37	1.65
11			1.00	1.25	1.24	1.51
12				1.12	1.12	1.39
13					1.01	1.27
14						1.15

from 10:1 to over 12:1, and this example could be expanded. Clearly it would be preferable to take the price point as free-on-board the ship, including the import dollar cost of log hauling and of log loading.

This would evaluate the economics of the trade as a whole, and not only the afforestation section. Unfortunately the information on port handling costs is confidential and the next analysis (which is being made) will be extended only to include haulage to take a free-at-shipside (f.a.s.) basis. In the interim, the results based on "loaded on truck" are worth comment on their own.

Price Points — in Time

The export log price and the log haul costs (plus profit component) used were as at April 1968. The import costs were post-devaluation and, in the main, were based variously on the period January to April 1968. Both costs and returns have increased since these dates, and the figures will need periodic revision. It is regrettable that no later data than 1959/60 are available for a full inter-industry study in New Zealand (Anon., 1966).

Relative Import Content of Forest Costs

It is reiterated that logging is overwhelmingly the most important constituent of forest costs in terms of import dollars. This result reinforces earlier conclusions (Fenton and Tustin, 1972; Fenton and Dick, 1972a, 1972b) on the importance of logging in overall forest costs. This dominance of logging cost is achieved despite the relative remoteness (in time) of the operation, and the effect of discounting (logging beginning in years 25, 19, and 15 on the three site indexes 80, 95, and 110 respectively). Although research is overdue on logging for its own sake (including a reduction of its exceptional accident rate) consideration of its overseas dollar cost would repay study. The capital cost of logging machinery operating in one year on a 25,000-acre gross forest (with 80% of the area actually growing trees) on site index 95 is approximately \$650,000 (at 1967 prices) or \$26 per gross acre. Use of criteria such as ratio of import dollars

required per unit of export dollars earned would provide further incentive to an investigation of the best man/machine combination needed for logging. It is possible that operations are overcapitalised.

Other classes of operation are (presumably) unexceptional in terms of import cost, but full comparisons with other industries cannot be made until more recent comparable studies are available. Naturally, few raw material costs are required, except indirectly, petrol and rubber. The items of predominant interest are the slightly-specialised heavy machines—mainly tractors, graders, trucks, and cranes, used in logging and roading. Much of this machinery is, at present, from North America; possibly Japanese or Russian equipment would be worthy of investigation.

Sensitivity

The figures are out of date but the detailed breakdown of cost elements in discounted terms provided in the original profitability studies and in unpublished data for this paper provide a simple means of updating the results. For example, if the import costs of *Dothistroma* protection spraying are increased by a rise in the price of overseas chemicals (though the price of copper has actually fallen) equivalent to 5c per acre, the discounted figures are multiplied by:

$$\times \frac{\text{New cost per acre (60c)}}{\text{Old cost per acre (55c)}}$$

Similarly, if there is any disagreement with the percentage of import content quoted for any of the items, the net effect can be found in the same way—by multiplying the discounted LEVs by new cost over old cost.

Obviously the full breakdown of original components, with the equally full expression of import costs enables an infinite series of cost sensitivity analyses to be made. Better data can be readily incorporated into the analyses as they become available.

To reiterate, changes in logging costs will affect results more than changes in other cost parameters.

TABLE 10—Effect of changes in volume, export price, and location—site index 95. Social costs are included

Interest rate %	Export Dollars per Import Dollar		
	500 cu ft per acre less volume	5% greater export price	Location 30 miles from the port
3	11.78	11.31	15.75
4	11.10	12.57	14.87
5	10.42	11.82	14.00
6	9.76	11.10	13.13
7	9.11	10.36	12.25
8	8.47	9.64	11.41
9	7.77	8.88	10.51
10	7.21	8.20	9.68
11	6.61	7.51	8.85
12	5.98	6.83	8.08
13	5.43	6.21	7.36
14	4.92	5.60	6.57

Results are very sensitive to changes in export prices and/or volumes, and alteration to the returns in Table 7 considerably affect the ratios of export dollars earned. For example, a reduction of 500 cu ft per acre was one of the (several) parameters altered in the profitability studies (Fenton and Tustin, 1972; Fenton and Dick, 1972a, 1972b). The effects of this reduction on returns and export earning ratios are given in Table 10 and illustrated in Fig. 1 for site index 95, assuming a unilateral reduction in returns and no concomitant reduction in logging machinery costs. The effects of a 5% rise in export prices on total returns and export dollar ratios for site index 95 are also given in Table 10 and Fig. 1. The very favourable effect of a closer location to port is also exemplified in Table 10 and Fig. 1.

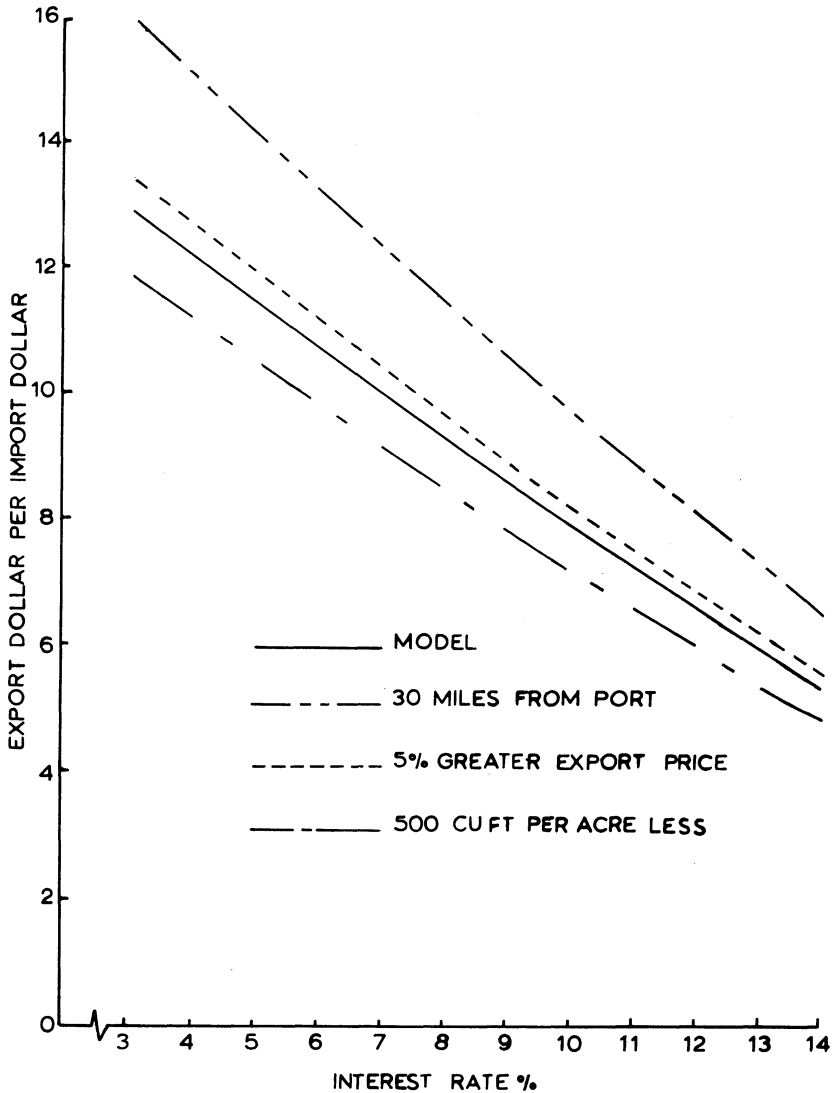


FIG. 1—Export dollar per import dollar—site index 95.

The underlying dominant variable in all forest profitability studies, as in any projects evaluated over time, is choice of an interest rate. The subject has been discussed without, in the authors' opinions, resulting in any perfect theoretical basis for choosing such a rate. Pragmatically a prevailing rate (if known) in a comparable resource — using industry such as power or agriculture has been used in New Zealand, and/or a Treasury ukase accepted. The latter is now (1971) 10%. Forest management is not inflexible, but can be adapted to some extent to accommodate economic, as well as a biological (or site) limitations. If the ground rules alter (by raising the minimum IRR necessary) then alternative regimes may be possible, with more favourable profitability results at higher interest rates. For example, the same technical object of management of two 39-ft logs has been imposed on all three site indices evaluated, but as has been pointed out (Fenton and Dick, 1972a) alternative management may suit site index 80 better in terms of some economic criteria. Still, a start has to be made somewhere in project evaluation, and results in all the log export studies are available for interest rates of from 3% to 14%, for given technical objectives.

CONCLUSIONS

Analysis of profitability calculations of afforestation for the export log trade in terms of import dollars cost and export dollar returns shows:

- (1) Forest import costs are dominated by logging, on all three site indices, up to 13% interest rate.
- (2) From 8.2 to nearly 12 export dollars are earned per import dollar at 7% interest rate.
- (3) The superiority of higher to lower quality sites is maintained when the export-dollar-earned criterion is used.
- (4) Results are very sensitive to export prices, and volumes extracted.
- (5) The analyses should be extended to a free-on-board basis; a location closer to the port automatically increases the export dollars earned.
- (6) Comparative results are not apparently available for other New Zealand industries.

APPENDIX 1

DIRECT FOREST OPERATIONS — IMPORT COSTS

The full breakdown of the origin of direct costs is given in Appendix 3 of Fenton and Tustin. 1972. The operations recorded there are listed below:

Land Clearing

This import content has been calculated allowing a 6-yr tractor life, and is 35% of the total crushing and bulldozing cost. Expressed as a percentage of the total cost of land clearing inclusive of burning, the import content is then 14%.

Hand Planting

Overseas costs comprise labour transport only.

Machine Planting

Overseas costs comprise labour transport plus a proportion of the 10½% of overall costs of machine hire (\$1.05 out of total costs of \$10).

The tractor time required has been assessed as 40% import costs, or 40% of 0.93 = 37c per acre. The import content of the 0.12c per acre due to the Lowther planters has been arbitrarily set at 25%; so total machine costs = 40c per acre = 4% of machine planting cost.

Aerial Sowing

Plane hire only; total plane cost is 7.5% of the operation. The import content of the plane hire is 15% (based on item 104 — “Air transport” of Anon., 1966); so total plane import cost in aerial sowing is $\$10 \times 7.5\% \times 15\% = 11.25c$ or 1.1% of sowing cost.

The overseas cost involved in seed collection and extraction would comprise transport, plus a proportion of the machinery and building involved. The analysis did not extend this far, as a guess the overseas costs are low.

Blanking

Labour transport only.

Release Cutting

Labour transport only.

Thinning to Waste

Power saws cost \$116 per year in overseas exchange, or 48.3c per working day. The percentage of the total cost of \$22.2 per acre at 1½ man-days per acre is therefore:

$$\frac{116}{240} \times \frac{3}{2} \times \frac{1}{0.222} = 3.26\%, \text{ or } 72.5c \text{ per acre}$$

\$50 Purchase + \$66 Running.

APPENDIX 2

PROTECTION IMPORT COSTS

Fire Protection

1. General Fire Equipment and Radio

The inter-industry study item 92 “Manufacturing NEI” (Anon., 1966) has been used for these items. The import value is 20% of the ex-factory value. The cost to the forest includes transport, trade margins, and administration costs. There is no evidence as to the amount added between factory and forest; so it has been assumed the cost doubles. Import content has then been taken as 10% of forest cost. (A similar approach was used for “Class A” stores.)

2. Vehicles and Mechanical Equipment — Capital Cost

Import cost landed at main New Zealand ports has been given by the various agents. (This applies to all vehicles and mechanical equipment, as well as forest protection items).

3. Vehicles and Mechanical Equipment — Repairs and Maintenance

The import content was based on analysis of the Rotorua Conservancy fleet account. The total Repairs and Maintenance for the fire engine was \$660, of which 33 were overseas dollars.

4. Fuel and Oil

Derivation of the import content of fuel value is complicated by the fact that not only do some units use petrol and some use diesel but some of those using petrol pay the petrol tax and some do not. In the latter case the tax refunds are credited right back to the individual unit in Forest Service accounts and therefore are reflected in the costs. Accordingly, when the fleet account was being analysed, every unit was recorded against the cost of fuel by its departmental number; then by reference to the master list of petrol

tax claims all vehicles were segregated into two groups. The import content of fuel has been calculated by:

- (1) Advice ex Head Office: Petrol is 50% import cost before tax.
 Diesel is 60% import cost (no tax payable).
- (2) Vehicles using taxable petrol: Cost at Kaingaroa \$0.342/gal
 Less tax \$0.181/gal
-
- Price before tax \$0.161/gal
 50% of this net cost is overseas funds = \$0.0805
 But Kaingaroa charge-out price is \$0.342 + 10% = \$0.3762
 \$0.0805
 Therefore import content is $\frac{\$0.0805}{\$0.3762} \times 100 = 21.3\%$ (say 21%)
 i.e. 21% of the net charge against the vehicle is import content.
- (3) Vehicles exempt from petrol tax: Cost + 10% = \$0.3762/gal
 Less tax refund = \$0.1810
-
- Net cost in vehicle account \$0.1952

Therefore import content is $\frac{\$0.0805}{\$0.1952} \times 100 = 41\%$

(4) Units Using Diesel Fuel:

Cost of bulk supply delivered Kaingaroa \$0.1539
 Plus stores surcharge of 10% \$0.0154

Actual cost per gallon \$0.1693

But the import content is 60% of \$0.1539 = \$0.09234

So import content as a percentage of cost per vehicle or unit is:

$$\frac{\$0.09234}{\$0.1693} \times 100 = 54.6\% \text{ (say } 55\%)$$

5. Tyres and Tubes

Item 54, "Tyres and Tubes" in the Inter-Industry Study (Anon., 1966) shows that imports account for 36% of the factory-door values of these products. The average costs per vehicle-year have been extracted from Conservancy and Waipa Fleet accounts, but these values represent purchases at Government discount rates. It has been impossible to ascertain the mark-ups between the ex-factory price and the price paid under Government contract. A wholesaler's considered opinion was that the factory value would be approximately 50% of the wholesale price which is responsible for collecting a heavy sales tax. Because of the Government discount, and the 10% Stores surcharge added by the Forest Service, the ex-factory value is the equivalent of Forest Service costs ex fleet accounts less 28%. So with 36% of the factory door value being import value, the import content for each group of vehicles is 36% less 28% = 26% of the net average annual cost per individual vehicle category as disclosed by the fleet account analysis. The results are (figures slightly rounded): fire engine \$20 total, import content \$5.

6. Total Costs

The total annual costs of running the fire engine and tanker are, from sections 3 to 5 above:

Item	Fire Engine		Fire Tanker	
	Total	Import Cost	Total	Import Cost
	(\$)	(\$)	(\$)	(\$)
Repairs and maintenance	660	33	200	10
Fuel and oil	30	6	30	6
Tyres and tubes	20	5	20	5
		44		21

7. Fire Buildings

Item 107 of the Inter-Industry Study (Anon., 1966) gives import content of services as 9.3%, and we assume that this is based on the final installed cost. Fire Lookout and Fire Garage-cum-Store have been included here because import content is lower than in the case of commercial buildings (as they lack full plumbing and other fittings for example).

8. Firebreak Preparation

The capital cost of the major equipment required (an HD6 tractor) has been charged against the forest elsewhere. The total cost was \$390 per year, and 10% of this has been allowed as imports.

Dothistroma Control Costs

Two elements are affected: cost of flying and the cost of chemicals. Flying is practically 100% of cost in the case of aerial inspection (i.e., the inspecting officer's salary is insignificant). Ground surveys involve vehicles, but all vehicles are accounted for in the main list of plant, etc.

The cost of spraying has been calculated (from average costs to date) as:

Flying	25.7%
Chemicals	57.6%
Other	16.7% (non-imports)

The Inter-Industry Study (Anon., 1966) was used to derive import contents as follows:

Flying: Item 104 "Air transport" shows imports as 15.1%

Chemicals: Item 62 "Chemical products 'NEI'" 25.7%

The import content of "Chemicals" is based on the ex-factory values; therefore in applying the percentage to the cost at forest it is likely that the import content will be slightly overstated—even though the ratio be rounded downwards to 25%. So the total import percentage for spraying is: 15% of flying cost plus 25% of chemical cost, giving 18.2% of the overall cost.

APPENDIX 3

SOCIAL ITEMS IMPORT COSTS

Buildings and Accommodation

The Inter-Industry Study (Anon., 1966) shows the following import ratios:

Residential buildings (Item 94): 11%;

Commercial buildings (Item 95): 14.6%

These percentages have been applied to the capital, depreciation, and maintenance costs of housing, camp, and general forest buildings (the last-mentioned being treated as "commercial").

Services

Import content 9.3%, as in Appendix 2 Fire Protection, 7.

Roading

The import content of the grader and tip trucks required has been obtained directly. The import content of the repairs and maintenance of the grader at 15% (computed as for logging equipment in Appendix 4) is \$234; plus \$116 for fuel and oil (55%), plus \$26 for tyres and tubes, totalling \$376 p.a. (Data obtained as in Appendix 2, 3-5.) The corresponding figures for the tip trucks are \$45, \$82 (21%), and \$26.

APPENDIX 4

CLEARFELLING EQUIPMENT, AND VEHICLES IMPORT COSTS

Logging Machinery

1. Capital Cost

The proportion of capital cost was obtained directly from trade sources and/or Forest Service stores purchasing branch.

2. Repairs and Maintenance

For general forestry vehicles and plant the Rotorua and Waipa fleet accounts were analysed

for the year 1967, by groupings which led to the establishment of unit average annual repairs and maintenance costs for each of the following categories:

	R & M Cost	Import Content
	\$	\$
HD6 tractors	2,740	410
Gang transport	630	31
Passenger cars	280	14
Pickups and vans	400	20
Tractors	4,030	600
Log loaders	2,710	410
Logging arches	290	43
Hauler	2,400	360
Power saws	207	31

Passenger cars, pickups, vans, and trucks, Item 86 "Vehicle repair" (Anon. 1966) gave an import content of 5%. A feature of road vehicle repairs is the high volume of body repairs which consist almost entirely of labour in the form of panel beating—thereby giving a low overall import content for vehicles as a whole. It seemed inappropriate to use the same import content of 5% for logging plant and such like, as body repairs in the normal sense are irrelevant. The only other repair industry reported in the Inter-Industry Study is Item 87 "Aircraft Repair" which shows 19% import content. Considering the nature of logging equipment, the cost of spares, etc., it seemed that the import content would lie between the two enumerated groups but towards the latter. Somewhat arbitrarily 15% was adopted as the probable import content for heavy logging equipment and also for power saws.

3. Tyres and Tubes

These costs were obtained as in Appendix 2, Fire Protection, 5.

	\$	Import Content
	\$	\$
Gang transport	50	13
Mobile loader	100	26
Passenger car	30	8
Pickup and van	50	13

4. Fuel and Oil

As in the case of repairs and maintenance, unit costs were derived for the various categories by analysing the 1967 Rotorua and Waipa fleet accounts. This gave the following average costs per year:

	\$	Import Content
	\$	\$
HD6 tractor	220	55
Gang transport	210	26½
Passenger car	180	21
Pickup and van	180	21
Tractor	530	55
Log loader	270	55
Logging arch	—	—
Hauler	345	55
Power saw	85	41
Field service unit	200	41

5. Fuel Costs — Gang Trucks

This fleet comprises a ratio of 11 vehicles subject to petrol tax and 9 vehicles exempt from tax (the ratio ex Conservancy fleet account). The fuel costs have all been segregated and show:

11 vehicles cum tax	\$2,922/year
9 vehicles ex tax	\$1,096/year

Thus the weighted import content is:

21% of \$2,922	\$ 613
41% of \$1,096	\$ 450
	———
	\$1,063
	———

So the figure for gang trucks is $\frac{\$1,063}{\$4,018} \times 100$

Therefore 26½% of the weighted average cost charged in the Fleet account is net import content in the case of gang trucks. (Refer to Appendix 2, Fire Protection, 4, for derivation of the respective import contents.)

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