Crew Costing Principles

FICA
FOREST INDUSTRY CONTRACTORS ASSOCIATION

Introductions

FICA
FOREST INDUSTRY CONTRACTORS ASSOCIATION

BlackburneGroup
CHARTERED ACCOUNTANTS

Timetable

9.00am–10.15am	• Costing Principles • Key Concepts • Costing Models NZ • Machine Costing Components
10:30 –10.45	• Morning Tea
10.45-12.00	• Labour • Vehicles • Tools, equip, chainsaws • Overheads

12.00-12.45pm	• Lunch
12.45-2.45pm	• Profit • Historic costs & cost escalation • Calculating ROI • Where are your margins? • Summary
3pm	• Informe Costing App

Crew Costing Principals

- For estimating contract equipment, labour and business costs
- Widely used and accepted in the industry
- Others e.g. BM of Logging (BMOL)
- Used for the last 50 years
- Informe methodology is based around **averages** and **consistency** of application
- Can be based on independent input data or in-house data
- Key objective has been to monitor cost movement however models now available to allow actual cost & variable inputs.

Other key concepts…

- Historic Costs
- Cost escalation & interpreting cost trends and patterns
- Machine ownership and returns
- Machine Costing Examples

Costing Models NZ

- Business Management for Logging (BMOL, ex. Liro model) - 3rd ed. Oct. 2021,excel based
- Forest Company specific or Contractor specific
- Accountant/advisor specific
- INFORME Harvesting / Forestry / Engineering
- INFORME Harvesting APP 2025, online
- Most cost models & daily cost cashflows are accrual accounting based

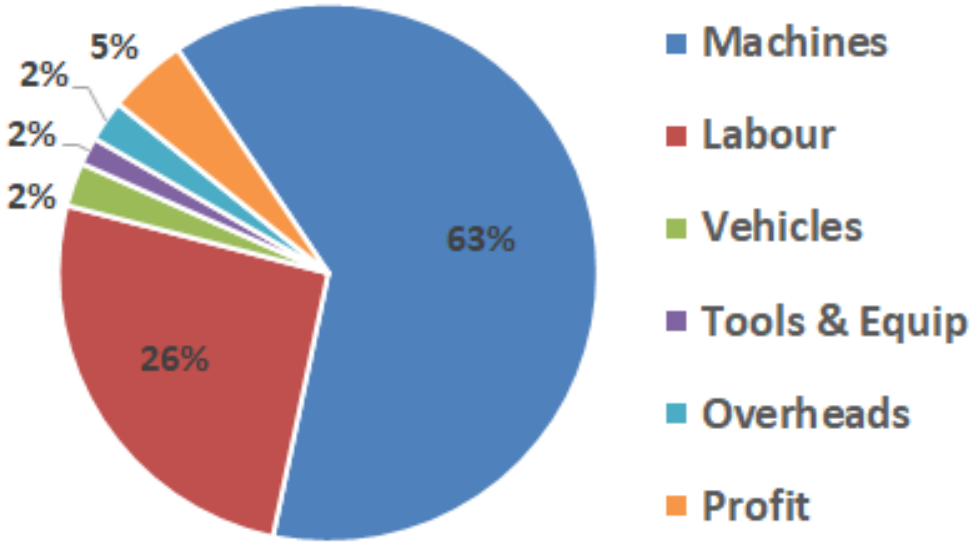
- Today we cover some key concepts to INFORME – however:

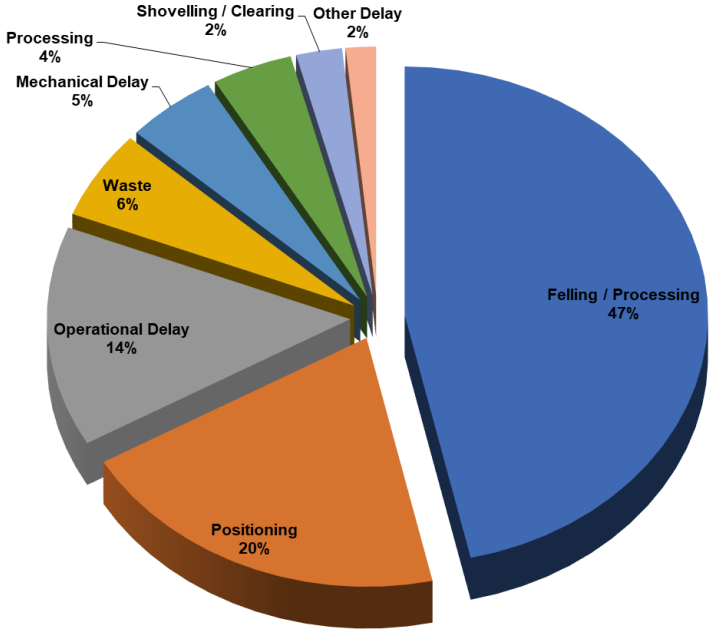
- **Given the same inputs and assumptions all these models can produce cost estimates within spitting distance of each other**

Costing v Productivity

Unit rate ($/m³) =

Daily crew cost / Daily crew production





INFORME Costing Principals

- Models estimate half-life costs & require annual updating and escalation (up or down). Cover this in more detail later.

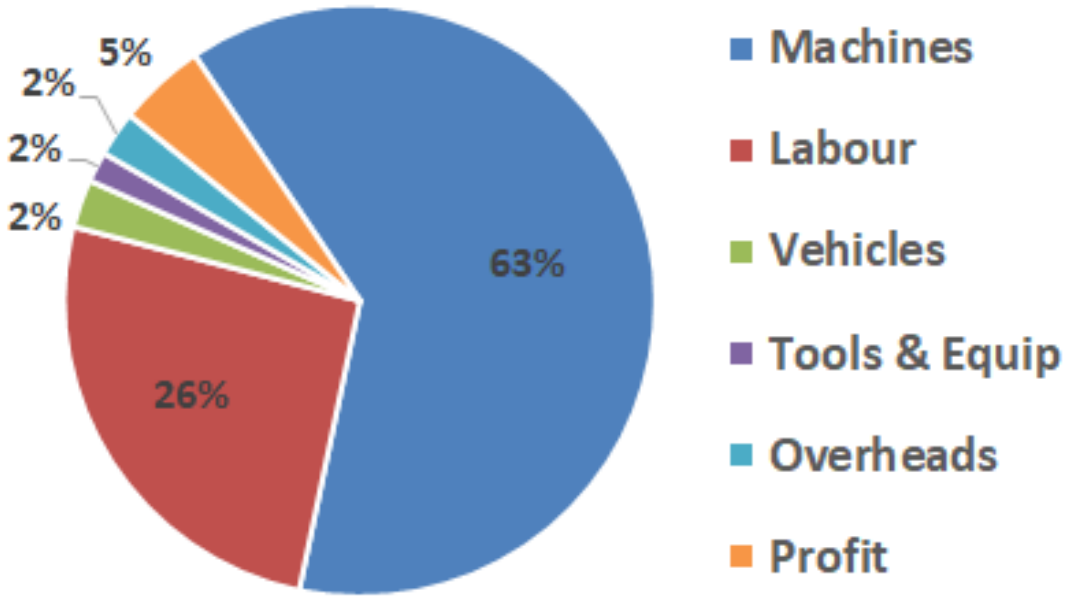
- Half-life based on industry surveys of groups of machines in a KW category **NOT** individual or specific machines.

- Models generally all conform to accepted costing practice

- ***There is no right or wrong answer to determining a crew's daily cost.***

Crew Cost Components

- Machines
- Labour
- Vehicles
- Tools/equip
- Overheads
- Profit



- Cost only the resources required for the job – not just what is actually used. This is often contentious

Machines - Cost Components

- Annual production work days
- Half life machine costings
- Capital values v historic value v residual value
- Standard hours v variable hours
- Machine life
- Residual value
- Finance v equity
- Interest/Risk/Profit
- Fixed costs v variable costs
- Depreciation – fixed v variable
- Machine overheads

Machines - Cost Model Examples

Excavator loader with harvest head for processing and delimbing
(includes head installation costs and guarding package)

	Base with harvest head for	22 tonne Thinning	35 tonne Clearfell
Current purchase price ($)		$824,876	$1,253,289
Historic purchase price ($)		$701,144	$1,065,295
Mid point kilowatts (kW)		125	200
Insurance loading		2.70	2.70
Mechanic ($/hour)		$70.29	$70.29
Diesel ($/litre)		$1.71	$1.71
Oil ($/litre)		$9.09	$9.09
Tyres ($/set)		$ -	$ -
Standard hours (on job 8 hours/day)		1,400	1,400
Variable hours		1,400	1,400
Machine life (hrs) = [7.2 | 9.3 Yrs]		10,050	12,999
Current delivery price ($)		$852,785	$1,295,657
Historic delivery price ($)		$724,878	$1,101,319
Average invested capital ($)		$476,903	$724,573
Insurance value ($)		$763,010	$1,159,292
Fixed depreciation ($/year)		$64,352	$75,586
Variable depreciation		$27,579	$32,394
Insurance		$25,822	$39,196
Interest / risk / profit		$51,506	$78,254
R&M Fixed capital		$48,264	$56,690
R&M Variable capital		$20,684	$24,296
R&M Wages		$42,288	$64,599
Fuel (Usage: 24.7 | 39.8 L/hr)		$59,181	$95,366
Oil		$6,052	$8,485
Tyres		$ -	$ -
Overheads		$24,275	$34,636
Indicative total annual cost		$370,002	$509,501
Indicative daily cost		**$1,574.48**	**$2,168.09**

MACHINE COSTING 2			
Machine - Function			**Processor**
Type			Cat336
Power (kw)			165
Year purchased			2019
Machine Life	Workdays per year		230
	Productive Hours per day		8
	Hours per year		1840
	Hours to be owned?		10000
	Machine Life (yrs)		**5.4**
Fixed costs			
Capital Cost	Current new price		$780,000
	Resale value (as a % of cost)		25%
	Current used price (after hours to be owned)		$195,000
	Tyre/Tracks life (hrs) *		6,000
	New tyre/tracks price		$40,000
	Annual depreciation		$100,280
	Depreciation ($/Workday)		**$436.00**
Interest	Proportion of ACI as loan		75%
	Proportion of ACI as owners equity		25%
	Loan interest rate		10.00%
	Owners interest rate		10.50%
	Weighted interest rate		10.13%
	Average capital invested		$541,320
	Interest ($/Workday)		**$238.30**
Insurance	Insurance Rate as a Percentage of ACI		3.0%
	Insurance ($/Workday)		**$70.61**
Total Fixed Costs ($/Workday)			**$744.91**
Running costs			
Fuel	Fuel price ($ per litre)		$1.30
	Fuel Usage	litres/kW/hr	0.22
	Fuel Cost	($/Workday)	**$377.52**
Oil	Oil as a % of Fuel		35%
	Oil Costs	($/Workday)	**$132.13**
R+M	R + M as a % of depreciation		70%
	Repairs and Maintenance		**$305.20**
	Tyres/Tracks		**$53.33**
	Rigging		**$0.00**
Total Running Costs ($/Workday)			**$868.19**
Total Machine Rate ($/Workday)			**$1,613.09**

Machines – Annual Work Days

- Days per year 365 days
- Weekends 104 days = 261days
- Stat Holidays 12 days
- Lost days 10 days
- Training days 4 days

Operating days per year = 235 days

Machines – Half Life Costing

Based on the daily cost (costs of operating and ownership) of a machine at the mid-point of it's working life.

ie. if a loader has a useful life of 6 years the estimated daily cost is based on the machine at age 3.

Machines - Capital v Hist Value

Capital values (purchase price) of new equipment

- review annually to guard against inflation.
- Also provides for escalation in repairs and maintenance

Historic Value -

Residual/resale Value – *very topical*

Insurance Value

Average Invested Capital

Machines – Std v Variable Hours

Standard hours (annual utilisation)

- The average annual standard utilisation for hauling units after breakdowns, production hold ups, weekends, holidays, and wet days are accounted for is 1400 hours/pa.
- The annual utilisation for loaders can vary when its known to be working additional hours, ie 1600 hours/pa.

Machines – Std v Variable Hours

Variable hours

- Independently adjustable from annual standard hours
- Allows for the machine to be tailored to certain work conditions
- Suits machines like backline machine/tailhold machine
- Impact variable costs such as fuel usage, tyre life, R&M etc

Machines - Life

Uncertainty regarding useful life when machine is used, especially yarders. Life is variable based on:

- Purpose
- Work Type (Easy/Tough on machine)
- Annual hours

- Generally – more mobile machines have shorter life than static machine ie skidder vs. hauler

Machines - Finance v Equity

Informe costings are generally based on a default:

- 70% finance
- 30% equity

This impacts the interest/risk/profit calculation, as well as fixed/variable depreciation.

Fixed default values in Informe publications, however Informe App & BMOL allows for specific equity ratios

Machines - Interest / Risk / Profit

Interest – based on long run interest rate (9%) on borrowed capital (70%) = 6.3%

Risk – the risk element of owning the machine = 3.0%

Profit - based on long run interest rate (5%) for equity (30%) = 1.5%

Interest / Risk / Profit = 10.8%

Machines - Fixed Costs

Fixed Costs (ownership costs)

- Depreciation (fixed portion)
- Repairs and maintenance (fixed)
- Hire purchase or lease
- Others?

Machines - Variable Costs

Variable Costs (operating costs)

- Depreciation (variable portion)
- Fuel, oil, tyres
- Repairs & maintenance (+wages)

If the variable work hours increase, there will be a significant increase in the estimated daily cost

Options to vary fixed and variable hrs

Machines - Depreciation

Fixed depreciation = 70%

Variable depreciation = 30%

Machines - Overheads

- Insurance
- Repairs and maintenance, both capital and wages
- Fuel and oil
- Tyres

(rubber tyred machines)

Machine Costing – Problem Areas

- Operating hours - accurate
- 2nd hand machines (productivity v costing)
- Haulers (cashflow/costing mismatch)
- Extended shift machines
- Low usage machines
- Stand down rates
  - Realistic?
  - Constraints

Labour – Costing Components

Annual labour costs are made up of:

- Labour days
- basic hourly rate (and any service allowances)
- annual production expenses (work days, non-work days, statutory holidays, annual leave, Saturdays)
- non-production expenses (ACC, PL, clothing, safety clothing)

Labour – Annual Work Days

Calculate annual labour costs and divide by 220 (different to machines).

365 days / year

- 104 days (weekends)
- 12 days (stat. holidays)
- 20 days (annual leave)
  - 10 days (non-work, S/L)
  - 4 days (training)

+ 5 days (Saturdays)

Note: Stat. holidays and annual leave changed due to recent law changes

Labour - Owner's salary

Single crew run by contractor

Include a salary or daily wage with labour costs

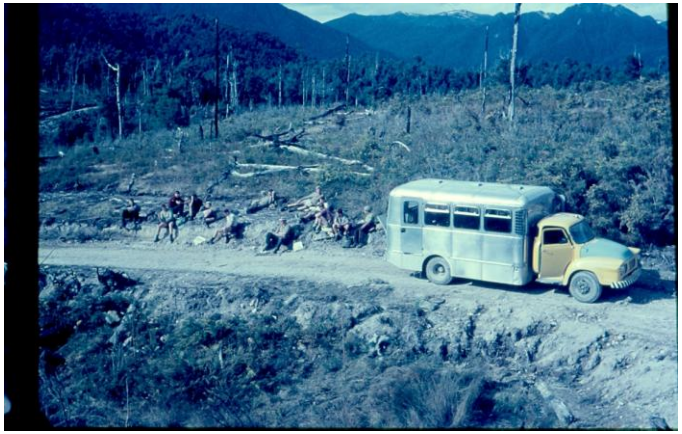
Multiple crews

Include a salary or daily wage for an on-site foreman

If a single owner owns and manages a number of crews how do you deal with his cost to the business?

Vehicles

- Type of vehicles required
- Number required (allow for loader operator who may work extended hrs)
- Lead distance



Moved away from crew transport and maybe a truck for the boss..

Now everyone has a ute!

Vehicles

- Purchase price
- Vehicle life
- Depreciation
- Residual Value
- Fixed costs
- Variable costs
- Costed over 235 days

4WD Double Cab Ute (diesel)

Hilux SR5 / Navara STX / Mitsi Triton VRX / Isuzu Dmax LS / Ranger Wildtrak

Average new vehicle price (includes registration, bull bar, towbar, deck liner, torneau cover)		$63,030	$63,030	$63,030
Lead (distance from town to skid)		45	60	100
Annual kms		21,150	28,200	47,000
Life (kms)		220,000	220,000	220,000
Life (years)		10.4	7.8	4.7
Annual depreciation rate		25.0%	27.5%	30.0%
Residual value		$3,162	$5,128	$11,871
Fixed (ownership) costs				
Insurance premium		$1,730	$1,730	$1,730
Vehicle licensing fee		$392	$392	$392
Warrant of Fitness		$84	$84	$84
Finance (on 70% of outlay)	12.01%	$3,206	$3,084	$2,942
Opportunity cost (on 30% dep	5.29%	$1,000	$1,000	$1,000
Depreciation		$5,755	$7,422	$10,929
Running (operating) costs				
Fuel consumption (litres/100km)		13	13	13
Diesel	$1.78 /litre	$4,897	$6,529	$10,881
Oil	$9.09 /litre	$77	$103	$171
Tyres (40,000km life)	$485.00 /tyre	$1,026	$1,368	$2,280
Road user charges	$67.17 /1000km	$1,421	$1,894	$3,157
Repairs and maintenance		$2,763	$3,563	$5,246
Indicative total annual costs		$22,351	$27,168	$38,813
Indicative daily cost (235 days)		**$95.11**	**$115.61**	**$165.16**
Indicative rate / kilometre		**$1.06**	**$0.96**	**$0.83**

Other Costings

- Chainsaws
  - Small cost, follow same format as machines

- Hauler accessories
  - rope, blocks, shackles, carriage, strops, talkie-tooters

- Job accessories
  - includes fire extinguishers, shovels, axes, tape, paint, sledge hammer, signage, tool kit, etc.

Overheads

Annual costs that will occur regardless of crew system or production.

Profit

Is profit the contractors right?

- Innovation
- Efficiency
- Greater production / longer hours

Historic Costs

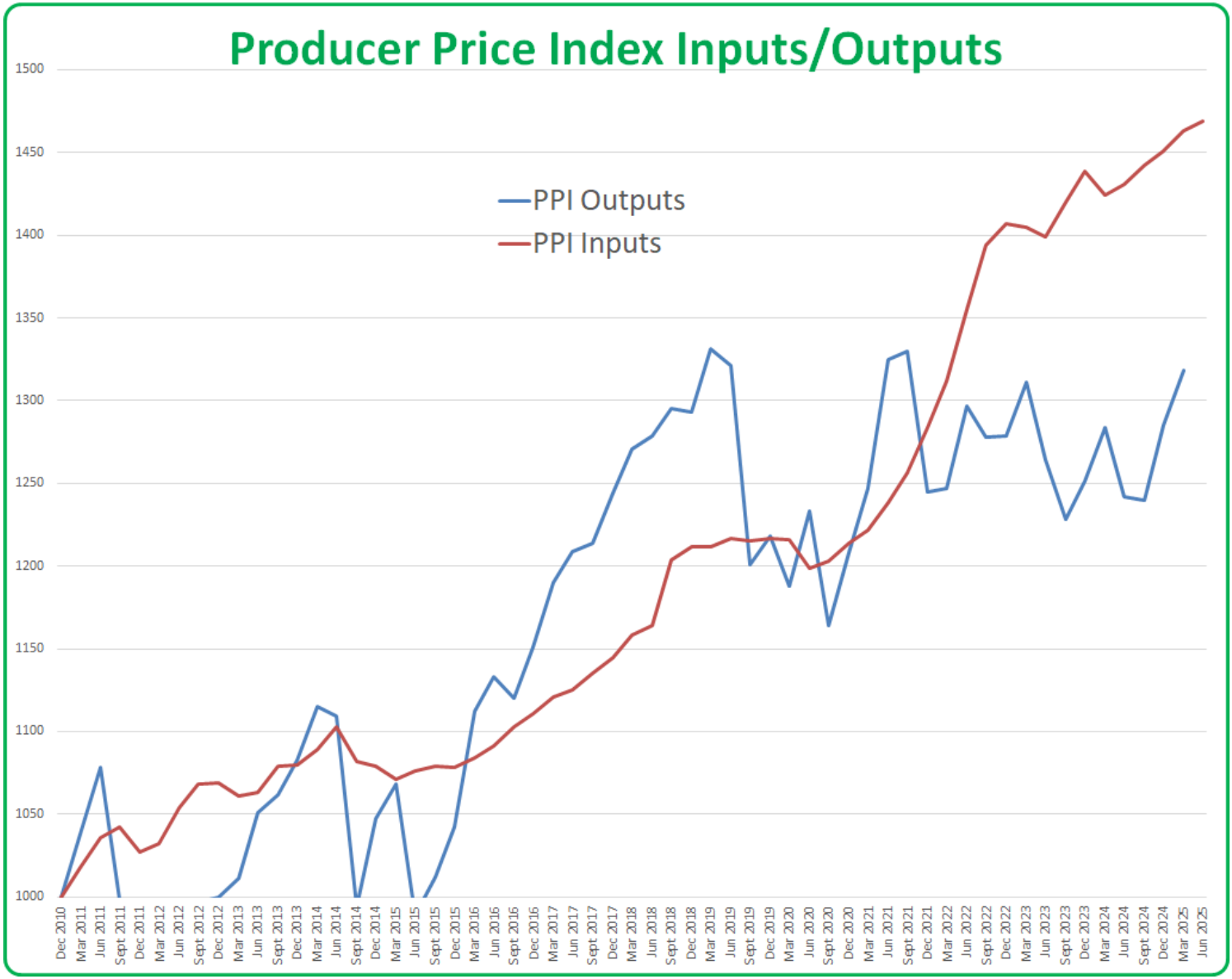
- One of a harvest/forest/roading business's most valuable assets is a good cost database
- Historic machine costs kept by machine, job, crew – a service history
- Cost codes allow comparison against estimated costs for regular monitoring
- Historic costs can be used to develop customised cost models for more accurate estimation

- Forest Manager Relationship – ensuring your costings are credible & get accepted

Cost Escalation

- When costs change (diesel, interest rates, capital costs)…
  - how much do you change logging rates?
- Escalation indices - monitor % cost movement (CPI & PPI)
- this % can be applied to negotiated or tendered unit rates

PPI Cost Trends 2010 – 2025

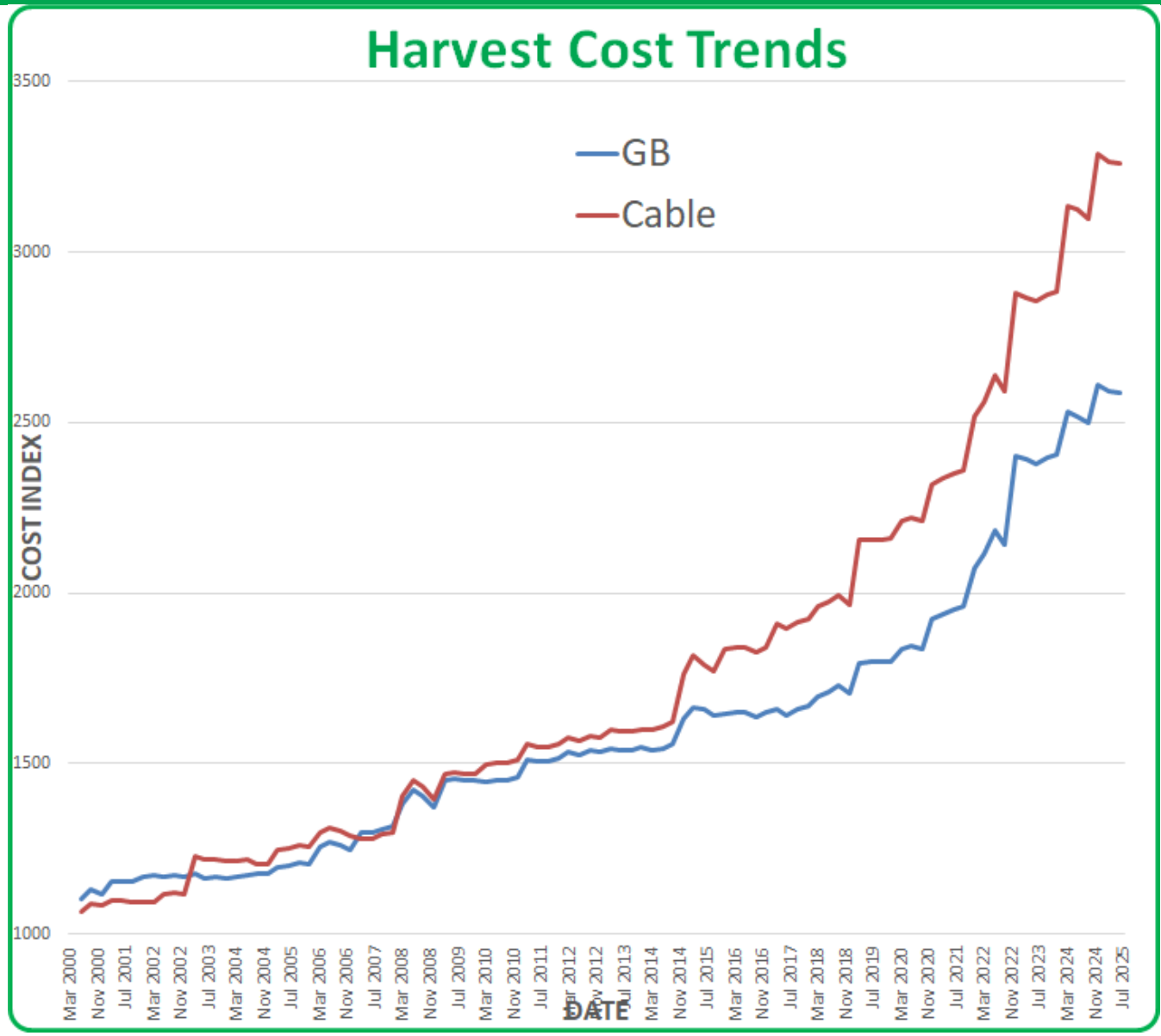


PPI Inputs
measures change in inputs of raw, semi-finished or finished goods and services.

PPI Outputs – measures the selling price received by producers for their output.

SOURCE: MBIE

Harvest Cost Trends



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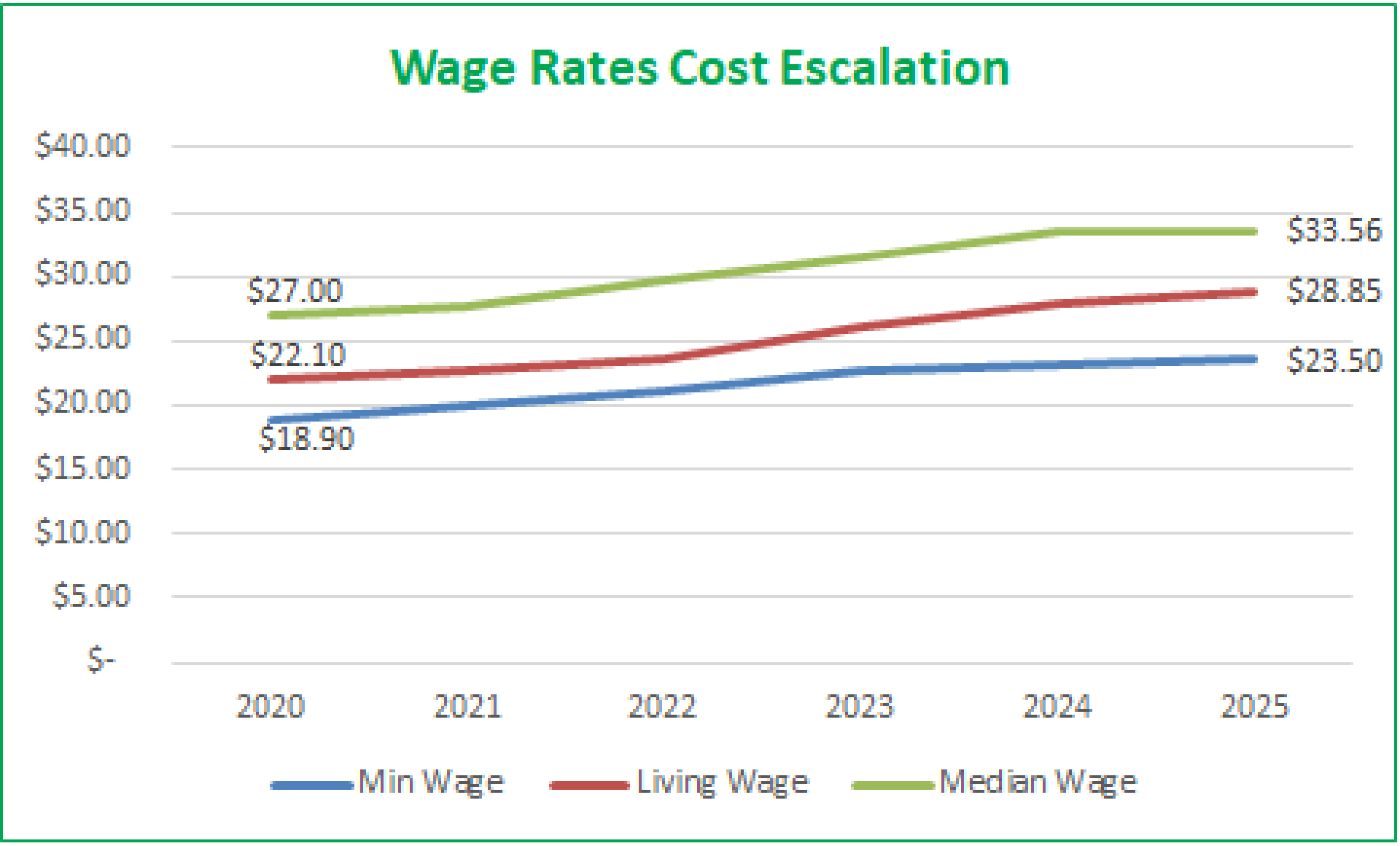
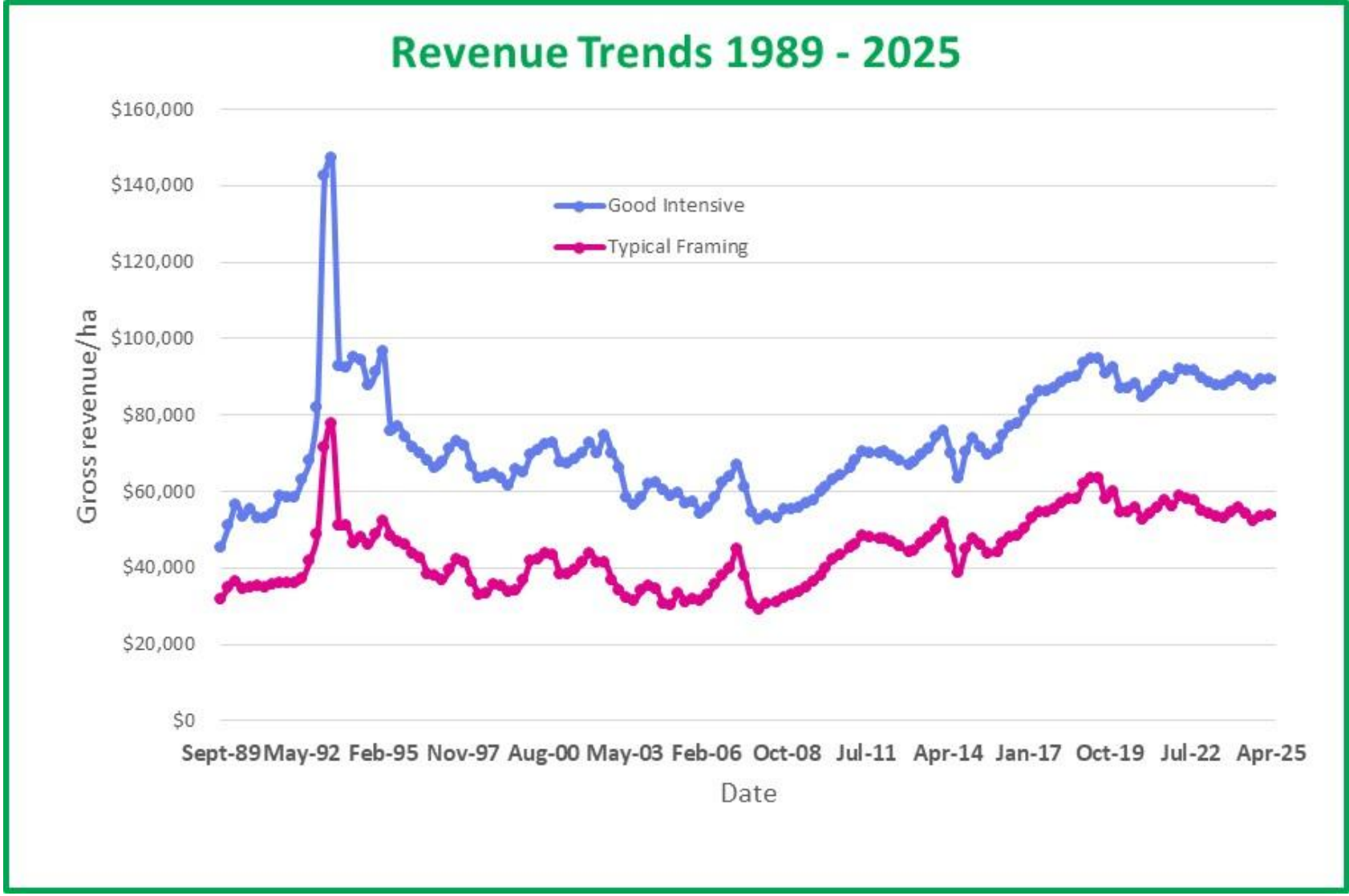
SOURCE: FORME

Labour Cost Trends



Revenue Trends



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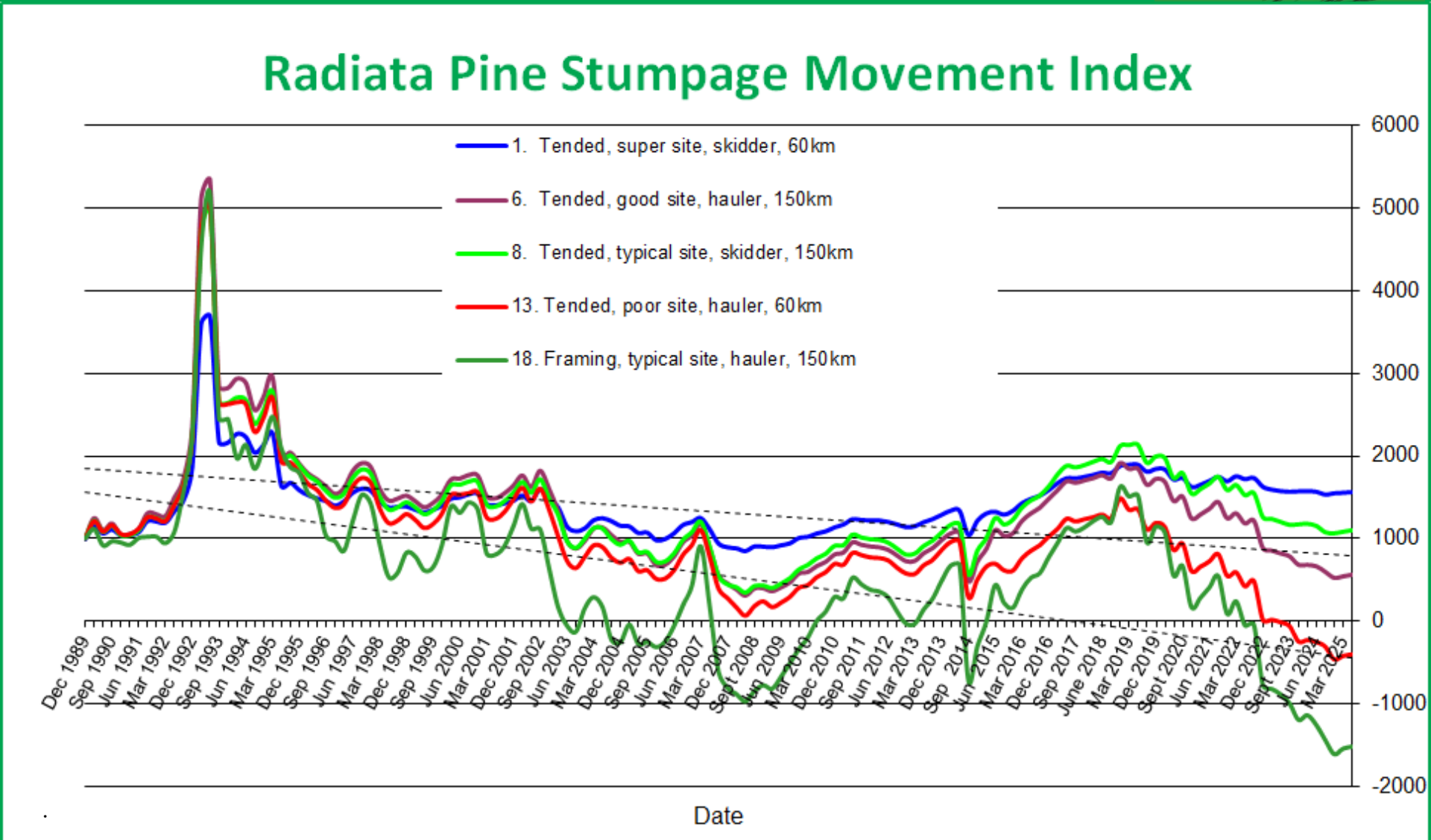
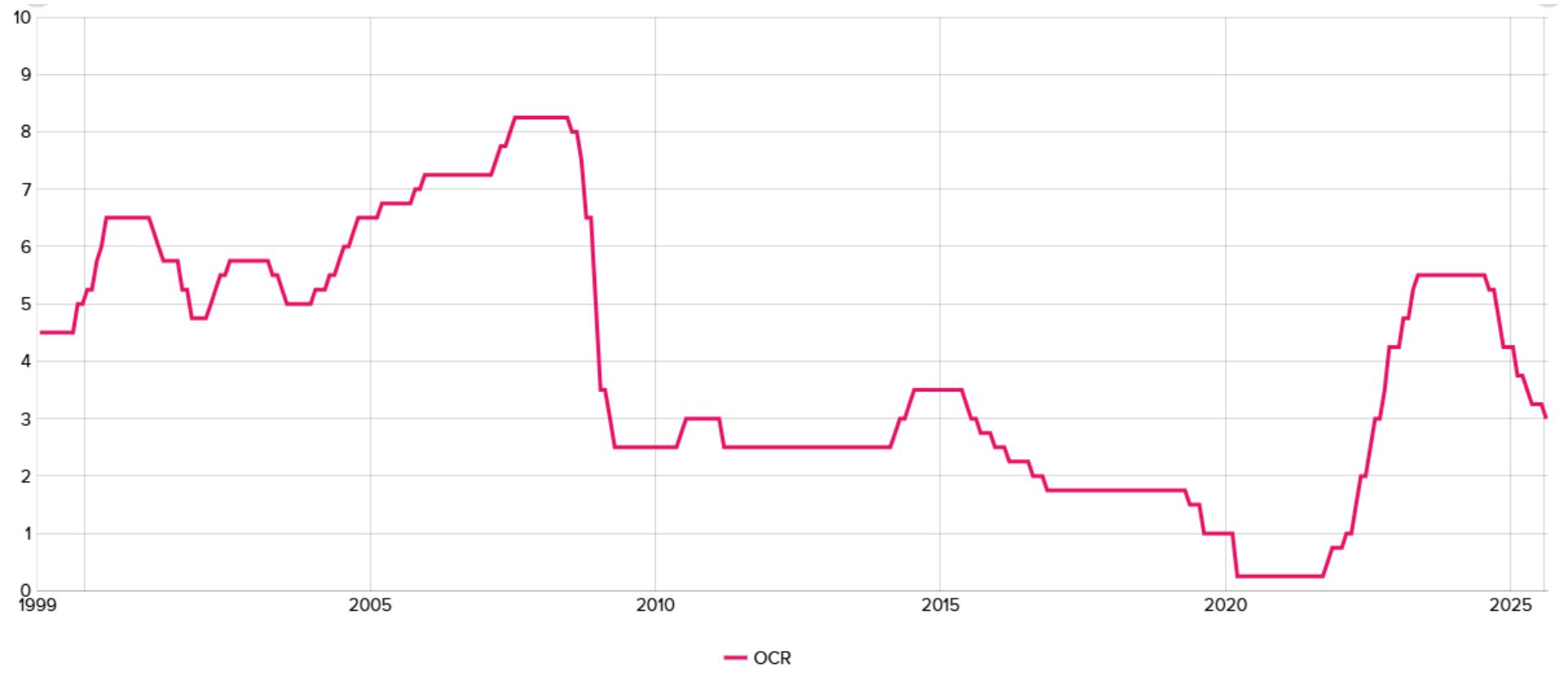
SOURCE: FORME

Stumpage Movements



SOURCE: FORME

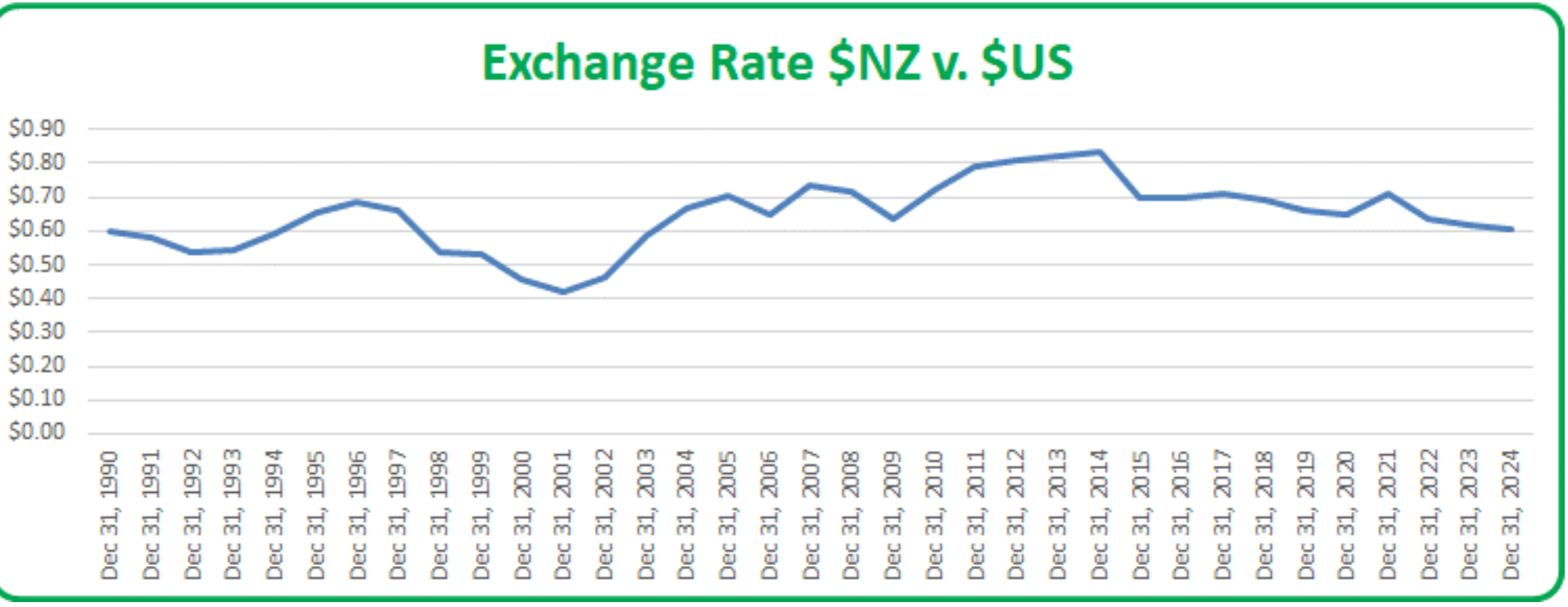
25 Year OCR



The Official Cash Rate (OCR) is an interest rate set by the Reserve Bank. It is reviewed 7 times per year.
It **influences all other interest rates and is, in effect, the wholesale price of borrowing or lending money in New Zealand**. It allows the Reserve Bank to meet its primary goal of ensuring price stability for New Zealand.

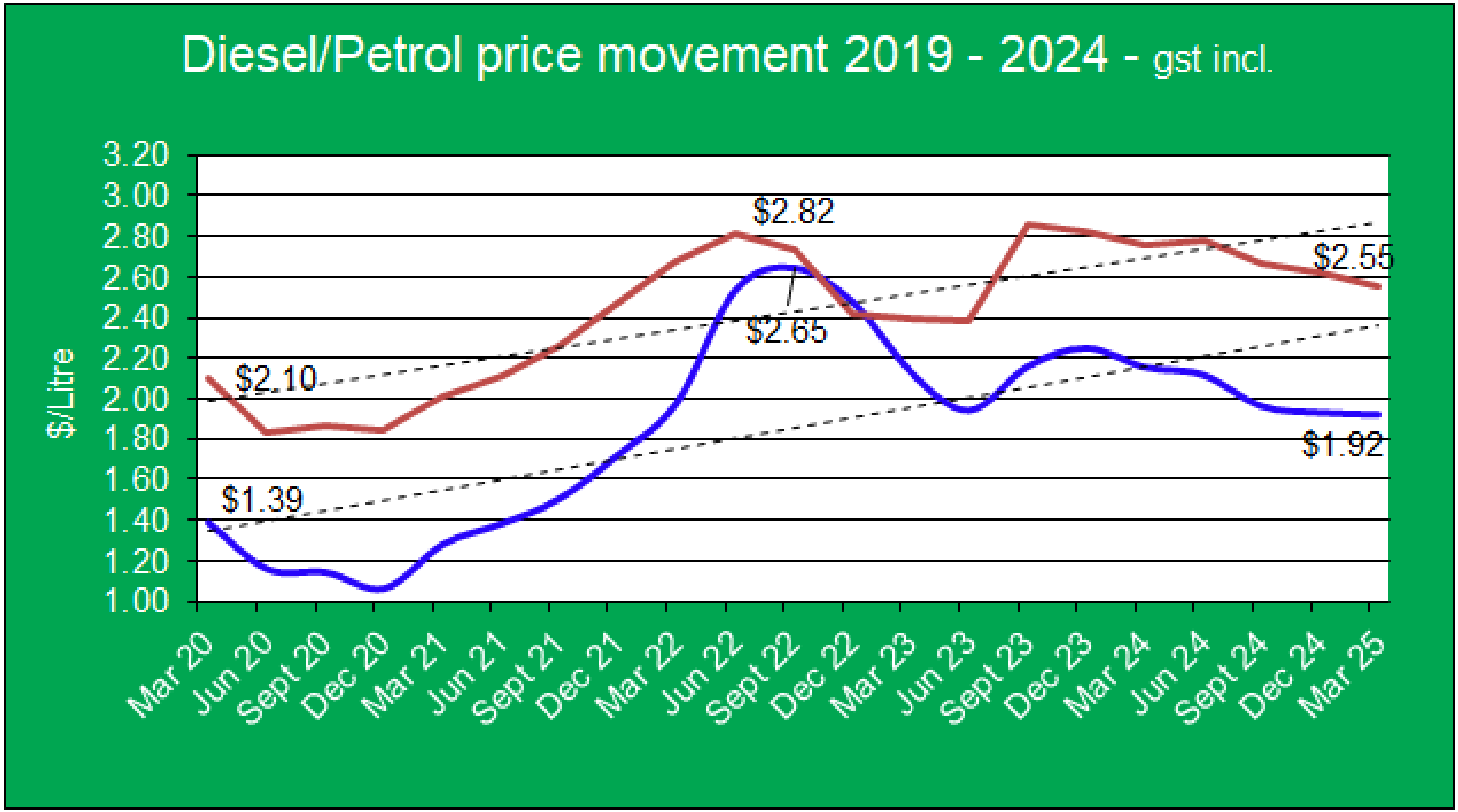
SOURCE: RBNZ

Exchange Rate



SOURCE: National Bank

Fuel Cost Trends



SOURCE: MBIE

Return on Investment

- How do you measure ROI or return on equity from machine ownership?
- What is the impact of
  - Reducing payment terms
  - Changing frequency of payments
  - Changed interest rates
  - Equity levels

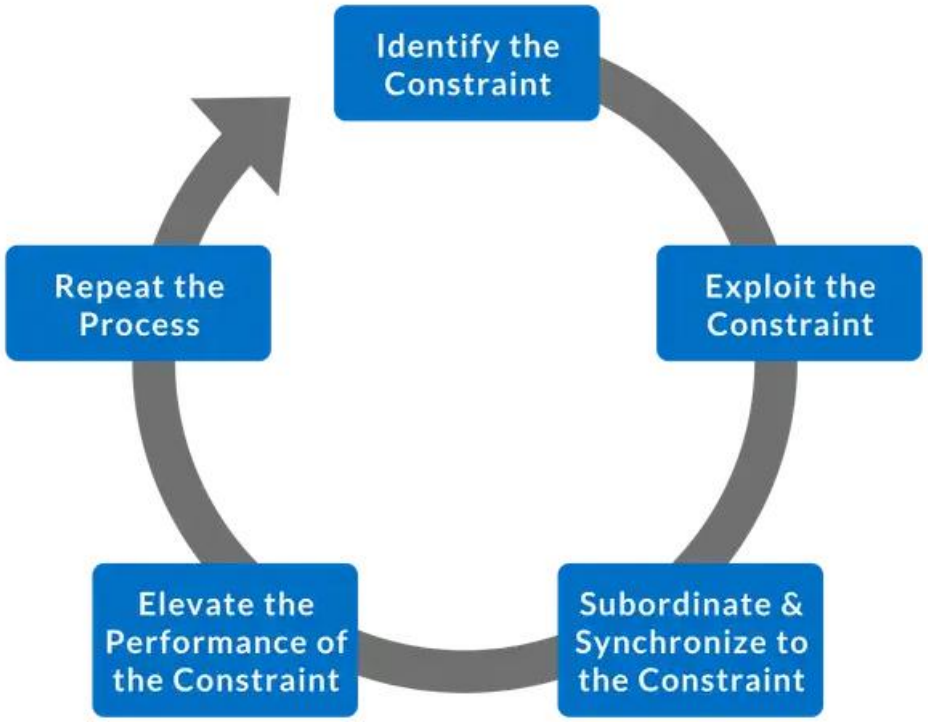
Resillience

- Review insurance – values/options
- ACC – re estimate
- Finance company/bank restructure
- Equipment sale
- Redundancy issues
- Fuel discounts
- Relationships/networks
- Comms with creditors
- Plant hire/sub contract
- IRD arrangements

Productivity

Constraints to Productivity

- ?
- ?
- ?
- ?
- ?



Information sources

- Statistics Dept website www.statistics.govt.nz
- Bank websites and forecasts
- INFORME (Forme Consulting Group)
- Forest Industry Contractors Association, "*Business Management for Logging – 3rd edition 2020".*
- Machinery suppliers
- Contractors
- Your own accounting & production monitoring system

Assumptions are most important!

Crew Costing Example

forme FOREST INDUSTRY CONSULTANTS

Cpt: Example **Cable / groundbased:** Swing Yarder

1. Machines (make / model)	kW size	Annual hrs	$/day
Swing Yarder Large	195	1400	$ 2,857.64
CAT 330 Tailhold Machine (anchor)	186	175	$ 391.77
Hitachi Tailhold Machine	186	87.5	$ 307.71
Felling Machine Large	210	1400	$ 2,120.94
Winch Machine (CAT)	200	1330	$ 1,535.96
Excavator Processor	35T	1400	$ 2,151.33
Grapple Loader (Load Out)	32T	1400	$ 1,169.10
Grapple Loader (Bunching)	32T	1400	$ 1,169.10
Skidder (4Wheel)	175	1400	$ 1,138.91
Grapple Loader (Shoot)	25T	1400	$ 1,034.30

Total daily cost of all machines: $13,877

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2. Yarder accessories / rope & rigging (if applicable) $496

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3. General accessories (tools / signs / shelter / safety equip.) $83

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4. Chainsaws	No.	$/day	
Skid Work Chainsaw	2	$ 65.26	= $131

5. Vehicles (make/model)	No.	$/day	Total $/day
4WD Ute (60km lead)	5	$ 110.51	$ 552.56
	x	=	
	x	=	

\+

Total daily cost of all vehicles: $553

6. Labour *(includes travel time)*	No.	$/day	Total $/day
Contractor / foreman	1	$ 731.29	$ 731.29
Machine Operator 1	2	$ 646.86	$ 1,293.72
Machine Operator 2	4	$ 519.88	$ 2,079.52
Bushmen	x	=	$ -
Breaker outs	x	=	$ -
Skiddees	1	$ 429.70	$ 429.70

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Total daily labour cost: $4,534

7. Overheads	$/year	Days/yr	
Admin / accounting / compliance	$74,888	235	= $319

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Total estimated crew daily costs ($/day): $19,991

8. Profit			
Profit *(example only)*	5	%	= $1,000

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Total Daily Job Cost: $20,991

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Estimated daily crew production (tonnes/day): 400

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Checked by: *Estimated unit rate ($/tonne):* $52.48

BlackburneGroup CHARTERED ACCOUNTANTS

Summary

- Cost models
- Daily crew costs
- Assumptions
- Historic actual costs
- Cost sensitivity
- Escalation
- Productivity

Thank You

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