

# The challenges facing contractors to achieve higher levels of mechanisation: The New Zealand experience

John Shrider

## Abstract

Contracting of felling, extraction, transportation and road construction and maintenance activities associated with forest harvesting and involving the use of heavy equipment has been a feature of the forest industry in New Zealand since the 1960's. The relationship between contractor and forest company however has changed considerably since those early days as has the nature of contract structure and the environment in which forest owner companies and contractors have been required to operate. Harvesting methods and systems have progressed from basic motor manual systems with emphasis on the manual to more mechanized systems with emphasis on sophisticated technology and high investment cost. The transition however has largely been reactive, very difficult and the barriers to completing that transition still loom very large.

## Introduction

Challenges facing the forestry sector and heavy equipment contractors in particular in moving to higher levels of mechanisation loom large and must be faced urgently if the sector is to benefit from the utilisation of large new areas of forests established over the past 15 years. By looking at our recent history we are able to highlight some of the more important and significant events and influences that have contributed to the position we now find ourselves in.

The most significant and common factor through the past 40 years of developing mechanization has been that common denominator, change. Dynamic influences in the macro-economic and social environment have almost guaranteed that any response to these influences have been reactive.

Developments in mechanisation, which by definition today means technology, require a two pronged approach. The first is the development of the tool or piece of equipment required to undertake the task and the second is the assessment and performance of the tool and the impact of any improvement in the context of its place in the harvesting system. The first requires a hands on approach to engineering and experimentation through trial and error, often unplanned or coordinated until the idea is sufficiently advanced to bring in the heavy artillery to refine and professionally design the commercial product. The second requires the industrial engineering approach to work methods, work measurement and system design and work balancing that investigates and improves the harvesting system. In New Zealand we have been very good at the former but inconsistent with the latter.

The reactive approach works well with the design of the tool to do the job as the trial and error process proceeds but the increased and more sophisticated requirements of system design and implementation requires a vastly different set of skills and greater commitment to well funded and managed research and development programs.

## Brief History of Mechanisation Developments

To fully understand the constraints that contractors face today with mechanisation we should just take a minute to summarise the development and progress of mechanisation in New Zealand over the past 40 years.

The end of the New Zealand Forest Service era coincided with the start of the transition from negotiated large volume stumpage sales by the State to smaller volume log sales with a much wider customer base. This also signaled a move from run of bush product lines including a large pulpwood component to more customer specified log types.

Generally most harvesting crews prior to the 1970's were configured with one or two tractor and arch or static yarder prime mover, plus large excavator based rope and grapple loaders.

The introduction of contractors in the 1970's represented the first large scale advancement in more mobile extraction systems although still largely within motor-manual systems. Machines such as skidders, including grapple skidders, and rubber tyred loaders focused on high production in large wood became the norm on the central plateau. Production thinnings operations were also a big component for the supply of pulpwood to the major pulp mills and a variety of motor manual systems were tried with varying degrees of success.

The 1970's also saw the introduction of the early feller bunchers for large scale post and pole operations, albeit in much smaller wood but ideally suited for mechanisation potential. The late 1970's saw the introduction of the first harvester and shortly after the incubation of that New Zealand icon, Waratah. Waratah has been an interesting story in that following the initial enthusiasm for mechanization in the 1970's there was very little local progress. In fact the development of the Waratah delimeter feller buncher (DFB) and the first of the felling heads occurred in Australia and it wasn't until the late 1980's

that interest once again picked up in New Zealand with large scale mechanized operations in Northland with the Waratah grapple processor. The Waratah Hydraulic Tree Harvester (HTH) was developed in the late 1980's but unfortunately the industry in New Zealand was non supportive. The owner of Waratah at that time, Dave Cochrane, in summing up an address at a NZLIRA seminar concluded:

1. "To logging managers who are looking at an increasing wood availability and a labour force that isn't: Look at mechanisation. Support your logging contractors: Make better use of the excellent general engineering facilities that we have in New Zealand. We can manufacture the low cost attachments that you need.
2. Secondly, to other machinery developers: If you are considering applying for Government funding for machinery development don't bother! You will probably spend more time and effort in the application and in the subsequent reviews and audits than you receive in the value of the grant. Also, if you are fortunate enough to get the support of the local forest industry, you need Government funding anyway!
3. But, if you still persist in spending four to six hundred thousand on machine development and are considering local manufacture.....reconsider! I certainly wouldn't recommend machinery manufacture in New Zealand to anyone! Take it to a country where your work will be appreciated.....Canada, U.S.A., Australia."

Dave Cochrane<sup>1</sup> probably didn't realise it at the time but how prophetic his words were. Waratah of course is now an overseas owned company and the industry forum where he uttered those words is no longer available for participants in the forest harvesting industry to gather and share and trade ideas. NZ LIRA, or more accurately its successor, NZ LIRO, was disbanded in 2000.

The rate of mechanisation through the 1990's has been largely dependent on and reactive to the changing environment rather than a deliberate industry strategy to mechanize. Changing topography as a greater percentage of harvesting is undertaken on steeper slopes with less stable soil structure, boom/bust harvesting cycles particularly through the price spike and subsequent Asia Crisis, changing labour markets, and of course the changing ownership structure have all contributed to the New Zealand experience. The development of the Waratah range of equipment however has now evolved to a stage where there are significant numbers of felling and processor heads in operation and their application has become the machine of choice for many contractors as they have been steadily adapted for the larger branched tree that we grow in New Zealand.

<sup>1</sup> Managing Director, Waratah Engineering Limited

The challenges to mechanisation today and leading towards the second decade of the 21st century have their genesis created by instability in the operating environment of the past 20 years in particular.

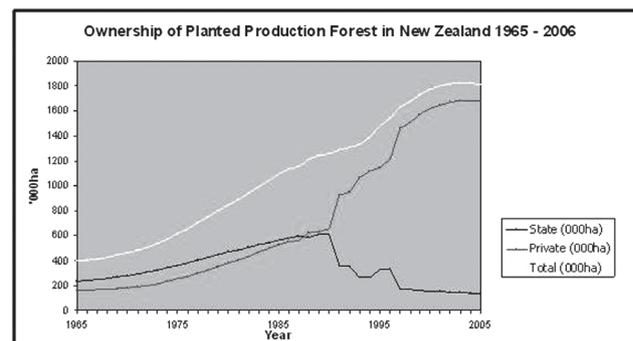
I have identified several factors that I believe have constrained a more strategic and measured approach to higher levels of mechanisation and I will expand on these.

They are presented in no particular order.

### 1. Insecurity Caused by Dynamic Changes in Forest Ownership

Perhaps the one most influential factor constraining contractor uptake of mechanisation has been the instability caused by changes in forest ownership (Fig 1). This is particularly true for the past 20 years. In order to understand the scale of that change we should review the recent history of forest ownership. This can be separated into 4 distinct eras many of which were heavily influenced by other macro-economic factors of the time, some of which I have identified as being influential during the relevant era.

Figure 1



Source: MAF, NEFD A National Exotic Forest Description 2005

To retain some scale and relevance to the majority of foresters I have just focused on the past 40 years. This is also a suitable timescale when reviewing the mechanisation of harvesting operations in New Zealand.

#### The Forest Service Era - 1965 - 1987

Forest ownership from the mid 1960's into the mid 1980's was dominated by the Government with its department, the NZ Forest Service in control of over 60% of the production resource.

The majority of the remainder of the mature resource was in the hands of 2 major integrated forest companies, Fletcher Challenge Forests Ltd formed in 1981 when Tasman Pulp & Paper Company was incorporated into the enlarged Fletcher Challenge corporate structure and Carter Holt Harvey formed in 1985 from an amalgam of Carter Holt and Alex Harvey Industries and later to include NZ Forest Products Ltd. Both Fletcher Challenge Forests

and Carter Holt Harvey emerged from a frenzied period of acquisitions, takeovers and share market plays in the late 1970's and early 1980's that also coincided with the emergence of contractor harvesting crews and of course the demise of company crews.

This scaling back of company operations continued until 1987 when the last of the company crews were disbanded. This was a significant milestone in the history of forest ownership as it was also the year when the NZ Forest Service ceased to exist as a Government Department and became the Forestry Corporation, a State Owned Enterprise operating under a Board of Directors and vested with the task of managing the plantation estate on a 100% commercial basis.

In summary the features of this era could be categorised as follows:

- The demise of company owned and managed crews.
- Predominantly motor manual systems.
- Harvesting on favorable terrain.
- Introduction and establishment of mobile high production crews.
- Stable labour markets, stable owner operated contractor force with 5 year contracts.
- No pressure to mechanize as the product was run of bush with high pulpwood component.
- Some introduction of labour saving equipment e.g., grapple skidders, tracked skidders
- Largely uncapped contract volumes that allowed contractors to over produce and by doing so, reduce the fixed component of their per m3 harvesting costs.

### ***The Successful Publicly Listed Corporate & Log Price Spike 1987 - 1995***

Two significant forest asset sales rounds followed in 1990 and again in 1996 when the Crown assets vested in the Forestry Corporation were sold to a number of private and publicly listed companies including Fletcher Challenge Forests Ltd and Carter Holt Harvey Forests. The first half of the 1990's represented a period of boom with record export prices in 1993 - 1995 leading to unprecedented harvesting activity and a rich business environment for contractors. It also signaled the exit of a number of experienced and successful contractors who moved on to other vocations. At the same time the number of forests maturing in areas outside of the central North Island began to come on stream and presenting a whole new set of challenges to harvesting managers and contractors.

Features of this era included:

- The industry was dominated by 2 major integrated forest companies.
- Wider customer base with exacting quality standards therefore requiring significant increases in levels of in-bush merchandising.

- Buoyant export markets.
- Exit of established contractors with high equity levels in their businesses.
- Emergence of younger contractors with more debt.
- Requirement for specialist yarders for more difficult terrain.
- Still a generally stable labour market but pressure on training particularly with requirement for log making.
- Still largely uncapped contract volumes but pressure on costs starting to bite due to additional log making and quality standards.
- Demise of secure longer term contracts.
- Introduction of high production crews and quantum leap in mechanisation largely through the introduction of processing heads.

### ***The Tightening Profit Margins of the Corporates & the Asian Crisis 1995 - 2000***

The latter half of the 1990's, and in particular the Asian Crisis that struck in 1997 signaled trouble for the sector that led to tight bottom line business management practices. These times proved very difficult for contractors and one of the company responses was to enter into "key supplier" contracts where effectively a small number of key suppliers managed much of the high volume harvest programs. The key suppliers in turn hired smaller sub-contractor crews to undertake the work. The theory of "key supplier" was that many of the costs incurred by the forest companies in managing the harvesting operations could be passed to the key suppliers. Unfortunately the full intent was never realised due to increasing costs of regulation e.g., Resource Management Act 1990 and tightening health and safety legislation that spread responsibility equally amongst individuals, contractors and companies. Pressure on prices from the Asian Crisis fallout also led to a squeeze on profits for contractors.

This era signaled:

The collapse of the export market.

- Creation of super entrepreneurial key suppliers but loss of contact by these key decision makers with the bush face.
- Tougher regulatory pressure particularly with regard to worker safety requirements.
- Arms length contact with contractors by forest companies and wider span of control.
- Capping of production volumes thus diminished opportunities to maximize efficiency.
- Exit of smaller contractors, many with high levels of debt, who did not have contracts.
- Appearance of company willingness to switch on and switch off contractors almost at whim.
- Significant drop in investment in research, including harvesting research and the demise of NZLIRO, and

other industry good funded initiatives.

### *The Disappearing Corporates and the Appearance of the TIMOs 2000 - 2006*

The last 5-6 years has seen further and very significant changes in forest ownership with the US pension fund TIMOs acquiring significant tracts of plantation forest ex the sale of Fletcher Challenge Forests and more recently the sale of Carter Holt Harvey Forests.

TIMOs have the belief that they can maximize returns from the asset through 3rd party ownership (Hagler 2006). This is done by unlinking the industrial forests from manufacturing operations and therefore providing flexibility to the timber owner that can improve returns. This means that under TIMO ownership management is dynamic which is perhaps not conducive under current contract structures to security of tenure for contractors.

TIMOs also thoroughly assess and ensure that investment decisions have quick payback and as in the preceding 1995 - 2000 era there is less enthusiasm to become actively engaged in industry wide initiatives although recent signals are that this may be changing.

The high \$NZ/\$US exchange rate has also meant that the export markets for wood products have remained depressed however a booming domestic economy has fuelled record harvest volumes which have led to claims of over-cutting by the cash hungry TIMOs. Until recently however, prices for logs have remained depressed while costs incurred in getting them to the customer have steadily increased. The environment for contractors has not improved with lack of security of contract tenure and very tight, if any, profit margins.

Characteristics of this phase of forest ownership in New Zealand include:

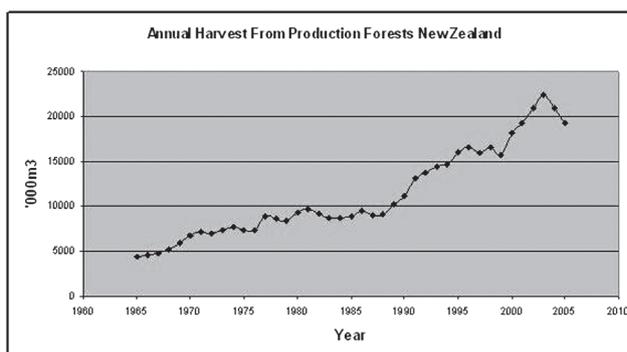
- The demise of the last of the large integrated corporates.
- Influence of the TIMOs who must be quick on their feet to maximize opportunities that meet their obligations to the pension funds.
- Entrenchment of arms length company/contractor relationships.
- Greater reticence by new or previously damaged contractors to enter into harvesting contracts.
- Emergence of forest management companies who are contracted to the TIMOs and who in turn enter into relationships with contractors.

## 2. Limited Availability of Reliable Strategic Information - New Resource and Harvest Rate Uncertainty

New Zealand has seen a steep increase of approximately

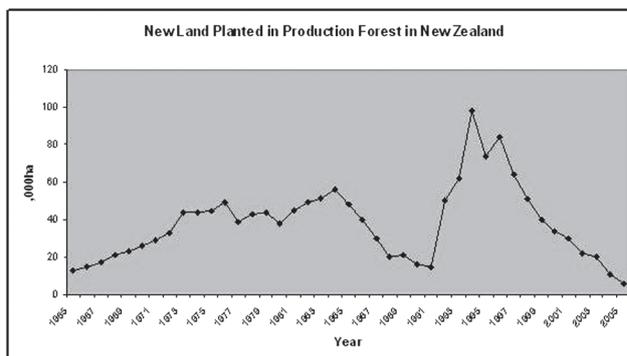
35% in harvest volume from 1999 to 2003 (Fig 2) and to some extent this was predictable if we look at the new planting rates (Fig 3) which showed a sustained year on year increase in new planting from 1973 through to 1985. The key factor however is that a large proportion of this new planting was in more difficult terrain where opportunities for rapid change mechanisation are constrained. The rate of mechanisation has quite possibly slowed in the late 1990's early 2000's due to the requirement for cable system development to simply recover the logs from the steeper topography but also to cater for more stringent environmental codes of practice.

Figure 2



Source: MAF, NEFD A National Exotic Forest Description 2005

Figure 3



Source: MAF, NEFD A National Exotic Forest Description 2005

We can also look at historic wood supply forecasts and compare these to actual roundwood removals for periods of time. Take the period 1995 - 2005 (Fig 4) where the actual harvested volume in 2005 was lower than all base, positive and negative cut scenarios proposed in 1993 (Ministry of forestry 1993). The primary assumptions for each of these scenarios were:

- Base Cut** Target clear fell age for radiata pine - 30 years
- Early Cut** Target clear fell age for radiata pine - 25 years
- Late Cut** Target clear fell age for radiata pine - 35 years.

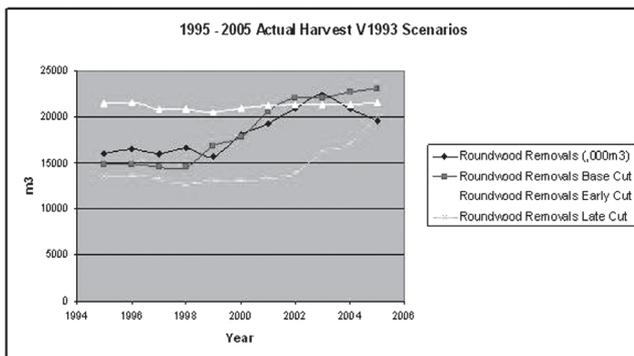
What the data doesn't tell us is of the strong anecdotal evidence that harvest age in New Zealand has reduced considerably over the 1999 - 2003 period, possibly as low as 23-24 years old which would suggest that we should look at the early cut scenario as the one that should have been

best fit for our actual cut. The graph would tend to suggest a different story and while the intent is not to be critical of forecasts it does reinforce the notion that it is notoriously difficult to use this information for strategic planning for additional resources (contractors) or the types of systems (mechanisation) that they may employ.

Just to confound things further the following extract provides a summary of the last 2 years roundwood removals:

*"Forestry production (roundwood removals) slumped in the year ended March 2005 and rose slightly in 2006. Overall, roundwood production for the year ended March 2006 was down 7 percent on 2004. Fluctuations in production reflect weaker profitability as a consequence of the strong New Zealand dollar and high labour, fuel, energy and shipping costs. As a result, some large forest owners have reduced harvest levels to increase the maturity of their forests and improve wood quality." (MAF 2006).*

Figure 4



We can predict with some certainty that based on the significant increases in new planting rates from 1995 - 2000 that there will be a requirement for similar resource deployment in 2020 - 2025. What we don't know is what the other macro economic conditions will be that will drive forest owner's decisions to harvest early, late or not at all.

We also know that unless there is better knowledge by contractors on how to access strategic information about the wood resource, infrastructural requirements and wood flows, the requirement for their services will be pronounced to them as fait accompli and without the necessary forward planning and information sharing so necessary to enable risk analysis and more secure investment decisions.

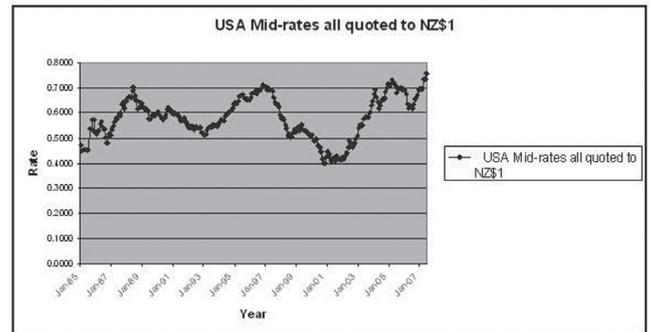
### 3. Lack of Certainty With Financial Drivers

#### Exchange Rate Volatility

Exchange rates (Fig 5), in particular the \$US/\$NZ, have a significant impact on contractor confidence to

invest in the research and development required to increase levels of mechanization. In general the components, including the raw materials, of heavy equipment are sourced from off-shore and in general traded in \$US. The difficulty is that the NZ forestry sector is largely an export oriented sector, although the past 3-4 years have seen a very strong domestic economy, and alignment of all factors to achieve positive growth in returns is almost impossible to achieve.

Figure 5



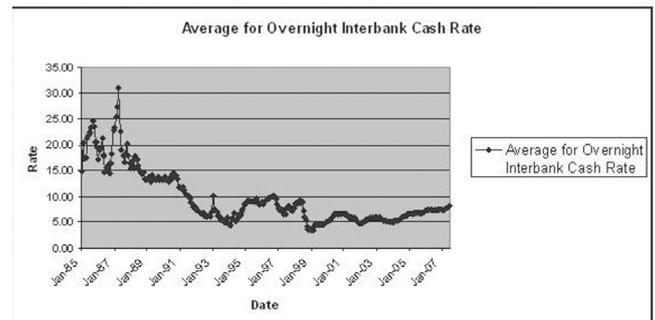
Source: Reserve Bank of New Zealand, June 2007

A lower \$NZ relative to the \$US will generally lead to more positive return for local growers and therefore stimulate supply chain activity. Unfortunately this creates an inverse or dampening effect as shipping costs and the cost of imported equipment and machinery also increase.

#### Interest Rates

Interest rates (Fig 6) have remained remarkably stable in New Zealand over the past 5-6 years which would tend to suggest a very good opportunity to secure funds to grow investment activity. Unfortunately timing has again been wrong and because of tight operational margins contractors have tended to operate on day to day cash-flow and divert reserves from business activity away from the sector, particularly into property.

Figure 6



Source: Reserve Bank of New Zealand, June 2007

#### 4. Lack of Positive Environment for Forest Engineering Research

##### *Demise of Logging Research Institute*

In 1997 the Chief Executive of Forest Research reported:

*"In February we launched our new identity, and it has met with widespread approval and acceptance. It has already helped to establish us as a more client-responsive and commercially-focused provider of valuable RS&T solutions to our increasingly commercial client base." (Heard 1998).*

This was a clear signal of a different approach to industry research and what was to follow.

The NZ Logging Industry Research Association ceased to operate as a research organisation in 1998 when its sale to Forest Research (LIRO) was completed. Its demise was a direct result of the sector restructuring that had been occurring since 1987 when its prime supporter and funder, the State (NZ Forest Service) went out of existence. Many of the new owners slowly started to question the value and benefits of such an organisation in a new business environment that demanded stronger bottom line performance.

Forest owners have gradually withdrawn support for industry good research and this has impacted back on Government funded support i.e., Government research models were supportive of investment in areas that were supported by industry. This proved to be a problem for most plantation management research programs with the outcome being a once world respected plantation forest research institute now focusing more on the generation of revenues from commercial clients rather than the traditional long term and blue sky biased research that had been a feature of a less commercial model.

Precisely the same outcome has been delivered for harvesting research.

Without an appropriate organisation to promote, manage and encourage investment in harvesting research contractors are more reluctant to carry the full risk of investment in mechanisation and this continues today.

There have been recent initiatives to revive interest in harvesting productivity work and a recent article by FICA (Forest Industry Contractors Association) is of interest.

*".....there has emerged a gap in knowledge between forest contractors and the managers now employed by the new groups of forest owning TIMOs.*

*The extent of that knowledge gap is glaring when FICA representatives suggested the wider question be considered - how to improve the forest supply chain? By and large forest*

*managers look to contractors to answer this question as the company knowledge of how harvesting is organised and delivered has disappeared.*

*The exceptions are the (generally) smaller, integrated forest owners/managers who understand the need to build and maintain close relationships with their contractors.*

*Ask them how to improve the supply chain and they won't talk of the productivity of harvesting - they will talk about a need to rebuild trust and relationships. How can that happen? Its no secret that longer term contracts that reflect the risks associated with large capital purchases of forestry-specific plant and equipment would go a long way to rebuilding trust." (FICA 2006).*

##### *Difficulty in Acquiring funds for Private Research*

Current New Zealand tax law allows tax deductions for research and development expenditure provided all such expenditure is recognised as an expense for financial reporting purposes. However this is only available for up to \$10,000 in an income year. Also any research and development expenditure incurred in devising a patented invention is only deductible when the patent is sold. For forestry contractors who tend to spend their own time working on new developments over a period of several years this amounts to very little incentive.

There are numerous buckets of public money available for individuals or organisations to apply for research grants. The common response however from participants who wish to pursue this avenue is that the necessary paperwork and associated bureaucracy associated with application, review and audit is both complex and intimidating. While this process can be channeled through a broker or consultant the criticism is that it is easier to get the funding to pay the broker or consultant than it is for the specific research.

##### *Lack of Certainty of Contract Tenure*

Many contractors operate without a long term service contract. There are a number of factors that have contributed to this situation and reflect a constantly changing business environment.

In the early days of contractor participation in the sector there were very few contract terms of less than 5 years. This provided security for contractors to invest in equipment and plant and also provided lenders with security to loan money over a sufficiently long timeframe. Another important feature of those early contracts was an inbuilt agreement to review contract rates that accounted for changes in capital equipment pricing and regular changes in cost components that affected operating costs e.g., fuel, tyres, spare parts etc. This contract model recognised the volatile and usually high inflation experienced at the time and resulted in high levels of trust and common objective by forest owner and contractor.

The model today is a little different and is a major contributor to contractor indifference about risking investment in a harvesting business. While many contractors have worked with the larger companies for long periods of time their legal relationship is month to month. This means that if there is a downturn in sales contractors are laid off. Many have responded to this by becoming larger contractors with several crews across a range of forest owners or simply by sub-contracting. They effectively transfer the risk to others who are less business minded but happy to have a go.

It is also relevant to make the point here that the industry is currently coming off a record high annual harvest of \$22.5m m3 in 2003 and there has been excess capacity in the system as the annual cut has retrenched over the past 3 years. This excess has either been permanently removed as disgruntled contractors have exited the industry or larger contractors have downsized and while still providing a contracting service might be reluctant to consider future expansion without greater contract security.

## 5. Nature of the Resource

From a paper in 1997 by the NZ Logging Industry Research Organisation:

*"One major factor preventing the rapid integration of mechanization into clear fell operations has been the tree characteristics of New Zealand's plantation forests. Approximately 90% of New Zealand's 1,239,000 hectares of plantation forestry is planted in Pinus radiata. Final stockings of between 250 to 350 stems per hectare are achieved as quickly as possible, usually by age 14 years, in order to maximize individual tree volumes harvested at clear fell. The consequences of this early low stocking, and fast growth rates, have traditionally been heavily branched (>10 centimetre diameter) final crop trees with large stem volumes averaging 2 to 5 cubic metres by 30 years of age". (Kirk et al. 1997).*

The recent trends discussed earlier have meant that the nature of the tree has changed quite significantly. We are now dealing with a smaller tree, maybe 1.5 to 2.5 cubic metres with a 4 - 6 metre pruned butt log, however the upper logs still tend to be large branched and suitable only for industrial grade logs and for pulpwood. This has provided opportunities for larger scale mechanisation and I believe these opportunities have been taken through the further development of the Waratah processors, harvestech delimiters and some imported equipment more suited to our tree type.

The other huge change has been the drift towards tracked excavator-based equipment due to the delimiting, access and environmental constraints imposed by the tree type and topography. Anecdotal evidence would suggest that the bulk of delimiting and log making activity is now performed by specialized processing heads. The magnitude

of this uptake however over the past 3-5 years is unknown as our industry has no way of monitoring this. We can say with some certainty that the traditional large branched *P radiata* tree will remain with us for some time and this coupled with a raft of other factors will tend to cement in higher levels of mechanisation over the next 5-10 years.

## 6. Other Factors

Some of the other factors that have retarded the progress of mechanisation through the 1970's - 1990's are now beginning to have more or less impact as changes in the wider environment filter through to our industry. A New Zealand forest industries labour market analysis in 2005 identified the main drivers of changes in employment numbers across the industry (APR Consultants 2005). Some of these included:

### i. Labour Market Issues

Competition from other industries for skilled labour and for higher remuneration in traditional forestry areas where unemployment levels are now low has encouraged harvesting contractors to more actively investigate mechanisation. Sourcing skilled and motivated people for a sector that has a short sighted approach to work security and lack of career pathways impacts on the confidence contractors have in investing in long-term projects like training. The educational qualifications of employees in the forestry sector are lower than the average industry qualifications with 33% of forestry and logging employees having no qualifications c.f. 19.4% for all industries.

### ii. Technology

Rapid technology change is driving a change towards increasing mechanisation across the forest growing and processing sectors which means that employment generated by forestry may be more modest than previously predicted but this employment will require more technology literate staff. There is however a training vacuum within the forestry sector for highly skilled and technically proficient operators and this is where the industry suffers for want of higher remuneration in recognition of the skills required. A formal machine operator selection and training programme is desperately required to lift our performance in this area.

### iii. Industry Factors

Industry factors previously identified including harvest volumes, planting volumes and industry reorganization which tend to have the most profound impact on contractors at the harvesting end of the value chain.

### iv. Wider Economic Changes

Sector development and international trade initiatives have tended to be fragmented in the past with numerous

industry organisations all operating in their own field without consideration of the impacts further up or down the supply chain. Issues identified include the effect of exporting more wood at lower costs, exchange rates, state of the Asian economy, strength of the US market and Government policies.

The APR report confirms some of the issues identified earlier in this paper and provides some confirmation that there has been a more rapid uptake of mechanization over the past 3-5 years however the question does need to be asked whether this has been in spite of the environmental conditions of the time or whether it has simply been forced on contractors because of the business conditions they have had to adapt to.

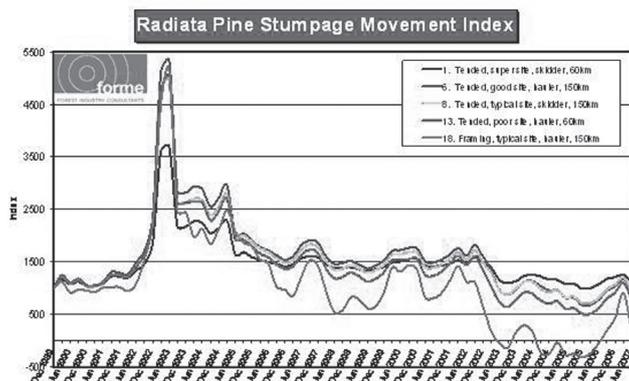
The wider question is whether mechanization can be a planned process or whether it is something that happens as a result of other events or circumstances. To help in answering that question there are two other factors that have impacted seriously on the ability of the industry as a whole to make progress over the past 10 years or so.

### Poor Returns for Sector Participants

To illustrate the serious nature of the trend to dwindling returns to the forest grower of the past 12 years the Forme Stumpage Movement Index (Fig 7) has been incorporated. The index monitors costs for a range of typical harvesting operations in different terrain and lead distance from the customer. It also calculates returns to the forest grower based on actual market prices at the appropriate dates.

Unfortunately the trend is very clear to see and unless there are significant upwards movements in returns to growers the availability of funds to harvest the areas projected over the next 10 years and provide an economic return are seriously threatened.

Figure 7



Source: Forme Consulting Group Ltd In-House Databases September 2006.

Competing land use alternatives are already having an impact on the forestry sector with significant tracts

of plantation forest now being converted to residential development, dairying or other more profitable use.

Plantation forestry contractors are in turn being squeezed as return on capital invested, ability to secure long term volume commitment, labour market constraints and other factors seriously undermine business success.

### Negative Public Perception of the Forest Industry

The public perception of commercial plantation forestry has been tarred with the same brush as in other countries. Persistent pressure from environmental NGO's, trends to locking up forests as a response to climate change, carbon sequestration and a host of other trendy and often scientifically bereft ideology has contributed to the industry having a negative image in New Zealand. This has unfortunately been reflected in restrictive and unbalanced Government policies that are articulated on a scale never before seen in the sector.

This has translated into the general public quick to climb on board popular bandwagons with the result that forestry as a career is no longer a viable option for school leavers. This has seriously depleted the stocks of well educated, technically proficient and manually adept people prepared to consider forestry as a technology driven industry that will remunerate people both from a financial and a job satisfaction viewpoint.

Our population is now largely resident in urban areas, forestry is a rural activity, and their public interface with the sector is with large logging trucks clogging the roads causing accidents, belching diesel, causing damage to roads, speeding past schools and of more concern, employing anti-social, hard drinking and drug using employees. While we in the industry know the reality is different this is hardly an image a sector desperate to attract highly qualified, respected and motivated people wants to present. Serious thought and action needs to be brought to bear if we are to see forest harvesting and engineering capture the engineering technology required to build on the somewhat staggering performance of recent years.

### Conclusions

There is no question that levels of mechanisation uptake by forestry contractors over the past 20-40 years has been indelibly shaped by the environment the sector has operated in.

In New Zealand the passage to mechanisation has most definitely been reactive rather than within a strategic planning framework determined by an assessment of existing and predicted environmental factors and a considered response to how we deal with those factors.

If we were to perhaps try and summarise the factors

identified in this paper into three super categories and attempt to classify each as a positive or negative influence on the ability or desire of contractors to pursue mechanisation our answers may not be flattering. They would include:

## *Economic*

The economic factors of the past 10 years have most definitely been negative. This is clearly illustrated in Fig 7 where the trend lines representing returns to forest owners are still heading south. This directly affects the ability of forest growers to invest in their service providers (contractors) businesses via industry good research and development and to pay fair rates that will in turn enable contractors to undertake similar investment in productivity initiatives in their businesses.

## *Social*

The environment for creating and maintaining an attractive employment option for highly skilled and motivated people has deteriorated significantly. Environmental ideology lacking in scientific scrutiny and negative perception of the sector as a resource consuming rather than a resource creation industry has resulted in severe pressure being placed on the industry's ability to recruit, retain and remunerate good quality personnel.

## *Strategic*

The forestry sector needs to work together towards a well researched and communicated strategy for improving the overall performance of the stump to customer wood supply chain. Better integration of felling, extraction and transportation activities, now almost the exclusive domain of third party contractors is urgently required. It is inevitable that the pressures created by the deteriorating labour market conditions will demand more of technology to compensate in what will be a capital deepening trend.

The pathway to mechanisation will always be in transition. The New Zealand experience has been haphazard and frustrating and while the barriers have often seemed insurmountable, there has nonetheless been progress. We will never know where we could have been had the appropriate structures for consistent research and development been in place but we do know that had they been in place we would be sitting much further to the right of the mechanisation continuum.

## **Acknowledgements**

Dr. Michal Brink, Forestry Solutions (Pty) Ltd, Pretoria South Africa, in conjunction with Nelson Mandela Metropolitan University was the catalyst for the preparation of this paper presented at the "Focus on Forest Engineering" conference in Nelspruit, South Africa in November 2006.

Similar presentations covering South Africa and European experiences were also included in the conference program. Further information is available if interested.

## **References**

- APR Consultants. July 2005: Industry Overview and Previous Research Review - New Zealand Forest Industries Labour Market Analysis 2005.
- Cochrane, Dave. June 1991: Development of New Zealand Mechanised Logging Equipment, Address to Logging Industry Research Association Seminar, Machinery Developments in Logging.
- FICA. September 2006: Forestry industry groups work to create new research body, *NZ Logger Magazine*.
- Heard, Bryce. 1998: *Directions* December 1998, Issue No 22.
- Hagler, R. 2006: Why Pension Funds invest in Forests, paper presented to NZIF Conference, Wellington NZ.
- Kirk, P.M.; Beyers, J.S.; Parker, R.J.; and Sullman, M.J. 1997: *Mechanisation Developments within the New Zealand Forest Industry: The Human Factors*.
- Ministry of Agriculture and Forestry. 2006: Situation and Outlook for New Zealand Agriculture and Forestry - July 2006, Update - Forestry
- Ministry of Forestry. April 1993: National Exotic Forest Description 1992 National and Regional Wood Supply Forecasts.