



Crew Best Practice – Costs and Productivity

Summary

This study was aimed at determining factors and characteristics that “best performing” cable logging crews from a sample of logging contractors in New Zealand had in common that could impact on their productivity and costs. While all of the contractors were very strict on safety compliance, they did not perceive any productivity advantages from that stance. Common factors identified by the contractors for improving their performance included: good communication; active daily contractor work involvement; proactive harvest planning; innovative thinking; use of new or well-maintained equipment; and partner/spouse involvement in business financial management. Recommendations are given for further improving a harvesting contractor business.

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INTRODUCTION

A key focus of the FFR Harvesting research programme has been the issues around steep country harvesting, the primary areas of concern being the health and safety of workers and the economics of current harvesting systems, especially cable logging.

Professional logging contractors face continuing challenges to be efficient and profitable. Examples include: difficulty in sourcing qualified workers; increasing capital and operating cost of equipment; and increasing regulation which has made the operating environment more complex, bureaucratic and costly.

No two logging crews are the same in terms of performance and organisation, due to the variables influencing these parameters. Harvesting systems are complex and difficult to compare, as a large number of stand, terrain and system factors affect the performance of a given contractor at a given site (Visser, 2009).

However, in many cases it may be possible to identify what better-performing harvesting crews have in common that separates them from “the pack” and results in boosted performance.

Factors Impacting Performance

As with any manufacturing industry, there are many factors associated with sustainable high production. Other research has shown that while safety is a crucial factor for the ongoing sustainability of the logging business, no one key characteristic or trait is

associated with successful logging contractors. The evolution of a successful contractor begins with effective management skills, leading to consistent production levels, financial stability, lower labour turnover, and fewer accidents (Sluss, 1992).

Wright *et al.* (2000) summarised the characteristics associated with safe and successful crew management, some of which were identified as:

- Visible contractor commitment to safety, with positive feedback and praise for employees when they choose safe behaviours;
- Careful selection of workers, with consideration of previous experience or recommendations and attitude to safety and of crew dynamics;
- Promotion of teamwork and rapport, with concern for the individual;
- Ability to effectively identify hazards and apply safe systems of work;
- High levels of mechanisation, good equipment and maintenance;
- Appropriate safety gear and personal protective equipment and encouragement for its use;
- Thorough accident investigation; and
- Regular worksite visits, or day-to-day involvement in the work.

In discussions, various researchers and forestry professionals from New Zealand and overseas shared their views on what factors result in low cost per unit production:

- Low capital cost equipment;
- Long equipment life (in productive hours);
- High scheduled hours per day or year – e.g. extended hours, double or multi-shifting etc.;
- High equipment utilisation rate;
- System matched to piece size and terrain (concept of system balancing);
- Low repair and maintenance costs;



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- Lower labour costs, or higher degree of mechanisation;
- Large payload (drag size) — drag size maximised for power of yarder/deflection available, bunched wood, etc.; and
- Short cycle time (irrespective of haul distance) — related to high line speed winches, more breakers-outs, electronic chokers, etc.

Part of being a successful contractor is securing consistent work, often through a tender process. In evaluating tenders, forest management companies, as principals, make the decision as to the successful tender based on a number of factors (Blackburne, 2009). These include:

- Adequate consideration of health and safety requirements;
- Skills and training records of the crew — number of appropriate unit standards and National Certificate qualifications held by crew members;
- The ability to provide quality assurance (based on regular internal quality control procedures);
- Compliance with Approved Codes of Practice and forest company policies and procedures (e.g., critical rules);
- Adaptability to new ideas/innovation;
- Condition of working equipment and ability to maintain desired production levels;
- Good employment relations (fair remuneration systems and employment agreements in place);
- Level of labour turnover;
- Ability to monitor crew performance and make appropriate adjustments; and
- Industry image and participation in industry bodies such as the Forest Industry Contractors Association (FICA).

Benchmarking Harvesting Cost and Productivity

Recently, a benchmarking system has been developed to track the cost and productivity performance of harvesting systems in New Zealand (Visser, 2009). For the initial sample of data, 14 companies (including regional offices of larger companies) contributed a total of 83 unique harvest area data sets. Harvesting crew productivity was calculated by dividing the total volume harvested by the total number of days worked and the scheduled hours per day.

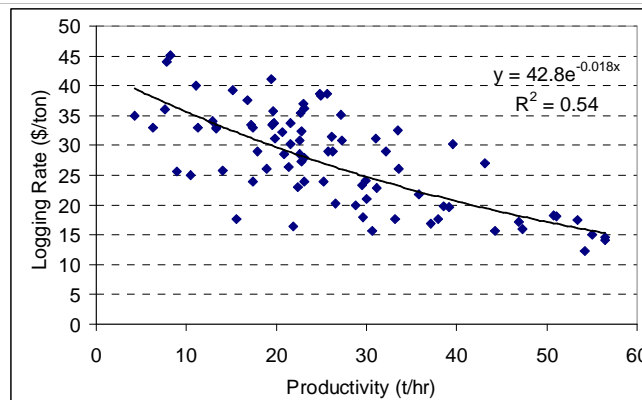


Figure 1. Correlation of logging rate and hourly productivity (Visser, 2009).

Among other things, this system provided the participating forest management companies with a tool to compare the performance of their own crews with national or regional averages.

Following on from this initial work, the purpose of this project was to determine the factors and characteristics that the “best performing” cable logging crews in the benchmarking database had in common that impacted their productivity and costs (Figure 1). In this project, the “best performing” crews were defined as those with the higher productivity (in tonnes of wood produced per hour) for the lowest rate (i.e., below the plotted line in Fig. 1).

METHODS

Crew Identification

Due to the confidentiality requirements of the Benchmarking project, Scion researchers had no access to the FFR benchmarking database.

The manager of the benchmarking database, Dr. Rien Visser, of University of Canterbury School of Forestry, through analysis of the data, specifically identified three crews in the database that had the highest hourly productivity, as well as the three crews that had the lowest logging rate (one crew was common to both criteria).

After being identified from the dataset as “a best performing crew”, the company and the crew were contacted for their agreement to be further studied before being directly approached by the researchers.



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By using a statistical modeling approach, two hauler regression equations were generated with logging rate as the dependant variable. Then the crews could be ranked in terms of negative “distance” from the average – or simply “other things being equal, which crew is doing the most work for the lowest logging rate”. Two crews were common to both sets. A number of crews featured in multiple groups, so there were seven crews in total. Four of these companies agreed to be contacted and be part of this project. The company supervisor of one of those contractors felt that one particular crew featured in the database as “best performing” solely due to “particularly favorable harvesting conditions”. As a result, this crew was withdrawn from the sample of “best performers” to be studied.

Data Collection

A questionnaire was adapted from Hide *et al.* (2009). The online diagnostic questionnaire for forestry contractors, DiagFor, developed by FPIInnovations FERIC Division, was also investigated (FPIInnovations, 2010). DiagFor was developed for Canadian forest industry members as a benchmarking and continuous improvement tool. This tool is freely available and can provide a holistic operational view for forest contractors. It can point out areas for improvement and sustainable successful business.

It gives a comparison of performance from basic knowledge and practices (Figure 2), but no active measurement of ongoing and systematic corrective actions based on analysis of continuous measurements.

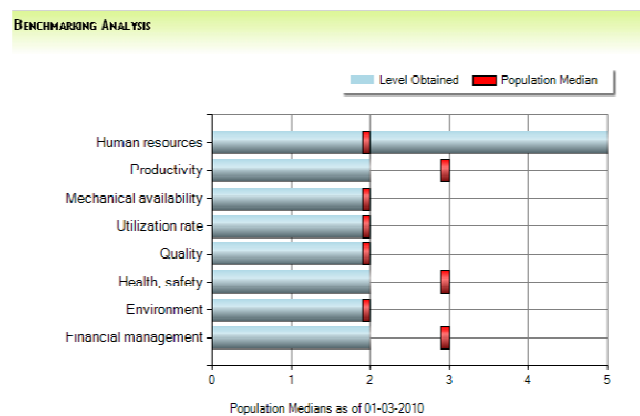


Figure 2. Benchmarking analysis (FPIInnovations, 2010).

It also gives recommendations for improvement of the business in eight different contractor responsibilities:

- Managing human resources,
- Maintaining equipment productivity,
- Maintaining high mechanical availability,
- Maintaining high utilisation rate,
- Managing product quality,
- Health and safety,
- Environmental compliance, and
- Financial management of business.

Although some of the questions are applicable only to Canadian conditions, the majority of them can apply to any forestry contractor around the world. New Zealand harvesting contractors may get benefit from evaluating their own business by using DiagFor.

The finalised questionnaire used in this study included mostly short answer questions ranging from safety-related issues to system balancing and innovation:

- Worker skill, experience, health monitoring,
- PPE and maintenance, workload,
- Training and supervision,
- Work scheduling, design, payment,
- Organisational goals,
- Equipment cost / life,
- Utilisation rate, maintenance schedule,
- Productivity enhancement,
- Crew performance monitoring, and
- Adaptability to new ideas/innovation.

Three elements from a toolkit of data collection techniques adopted in manufacturing studies were used to study the three identified cable logging crews (Jackson *et al.* 2004):

1. Process flow, work organisation and skid layout observation;
2. Collection of interview data from crew members and crew supervisors: and
3. Collection of interview data from harvesting contractor via questionnaire.

The crew members were interviewed on site during the process flow observation. The contractor interview process was relatively structured following a sequence of questions, but often discussions were broader when something relevant was prompted by the contractor. These interviews took place in a non-production environment.



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RESULTS

Supervisor and Crew Members Interviews

The forest company supervisors of the identified “best performing” contractor crews all agreed that the respective crews were indeed consistently well-performing operations. The operations all complied with company health and safety requirements as well as the Approved Code of Practice; they had comparatively low level of labour turnover and developed their skilled crew members; they maintained consistent production levels with good quality assurance.

The crew members shared different views and opinions on different aspects of the operations, but the perceived advantages were:

- Medium to long-term job security with the respective crew,
- Fair remuneration and benefits relative to the job importance,
- Good communication within the crew,
- Straightforward requirements, objectives and targets to be achieved, and
- Active participation in daily planning.

Some of the issues pointed out were:

- Time pressure and inconsistent work pace, especially for equipment operators (processor and loader),
- Location, size and layout of skid sites – most of the time it was perceived as poor harvest planning because of limited information available for the harvest planner;
- Length of workday and the limited opportunities for a social life.

Observations and Contractor Interviews

While all contractors were very strict on safety procedures, they did not perceive any productivity advantages from this stance. All crew members were equipped with appropriate Personal Protective Equipment (PPE) and were encouraged to use it, tasks posing significant risks were identified and documented for each site, they all attended regular safety meetings and monthly PPE audits were carried out.

All the contractors thought these requirements did “reduce accidents and crew members turn up daily, feeling safer and that the owner cares”. Machine operators ensured safe maintenance work and

adequate machine availability by usually doing the daily servicing and maintenance of the equipment they used themselves.

Within all three identified best performing crews there were common factors that were suggested as improving their performance:

- Communication on all levels – all crew members had a radio and everybody clearly knew what was being done and why. This seems to be crucial in all three contractors’ operations. They were able to explain every step during daily operations to everybody in the crew, they could quickly intervene when something undesirable was happening on site, and they could give directions and conduct on-the-job training for every person in the crew. “A lot of workers like being told what to do next”. This made it a lot easier to ensure a smooth work flow because “the key thing is to make it easier for the next guy in the line”.
- All of them took part to some extent in harvest planning process with company harvest planners – one of them stated requirements at least two skids ahead, the others often discussed the layout and harvesting logistics together with the harvest planner to ensure a good fit for their system.
- The owner was literally part of the crew. They all had an experienced and trustworthy foreman, but they were still there every day unless something important prevented them from being on site. For all crews leadership and supervision was vital – “but all workers have to be treated with respect and have to be listened to”. They all tried to earn the trust of their workers, provided bonuses for a job well done or extra time spent, and tried to provide little rewards every now and then (social drinks at the end of the week, and a dinner every once in a while).
- All were innovative in that they were doing more than just “traditional cable logging” – whether steep terrain bunching, two-staging, having two haulers pull wood to one processor site or supplementing the cable operation with a ground-based bulldozer wherever terrain permitted. All three were not afraid to try new things if it was considered advantageous. In all three operations, the purpose of the “additional development” was to ensure smooth and steady wood supply. With



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bunching and the subsequent two-staging a consistent and highly productive hauler utilisation was achieved, so if there was a hauler-related problem there was enough wood supplied for the rest of the crew to continue to work. The same was achieved by having two haulers working close to each other with one processor. Having an additional bulldozer pull wood also ensured a steady supply for processing in case of a hauler break-down.

- New equipment (or at least well-maintained equipment) was a common theme – they all agreed that consistent work with no breakdowns was vital for smooth production rates. All three definitely preferred new equipment when necessary and, when buying second-hand, they would upgrade equipment to fit their needs before including it into the operation.
- With all of the contractors, their partner was taking care of or was actively involved in financial management (book-keeping, ordering supplies, etc). One of the contractors stated that their accountant had advised them “that successful forestry businesses are those with a partner/spouse at home doing the books and costings/working out good deals etc”. Any excessive expenses or lower productivity trends were noticed quickly and dealt with before any major losses occurred.
- These contractors definitely appeared to have made a difference in their operations over time, and had separated themselves from “the rest” by achieving higher productivity and lower production costs. These achievements, however, do not necessarily ensure sustainable progress, and as all noted “there is always room for improvement”.

RECOMMENDATIONS

Some recommendations that may help other contractors are:

- Providing a written checklist to employees to help them perform a complete inspection of their workplace to identify elements that pose a hazard.
- Keeping records of the productivity data collected for each operator and each machine; calculating

weekly, monthly, and annual averages; analysing data to learn the reasons for any significant differences from these averages.

- Providing opportunities for improved communication between crew members as well as clearer production goal-setting, problem identification and ultimately, better ability to improve work methods and environment.
- Identifying the lowest productivity operators and taking action to increase their productivity, such as external training, coaching by better operators, and developing motivational strategies.
- Developing the ability of all employees to operate several machines (job rotation), to have more flexibility in case of absenteeism. This could include providing opportunities for improved harvest and logistical planning, understanding of leadership and supervision.
- Visiting other operations and taking note of the best work techniques observed, and then implementing these practices. This would enhance innovation not only for each individual contractor but also for the whole industry by sharing ideas and implementing them in practice.
- Implementing a “parts management system” to ensure that the critical parts required to operate machines are available as quickly as possible.
- Implementing a system to document each repair performed on all equipment, and using the operator and mechanic reports to supply data for this system.
- Analysing the causes of down-time and trying to identify factors that could be actively controlled and implementing an action plan to decrease the frequency of problems related to these factors. As beneficial as it is to use new equipment, these above recommendations are related to the use of second-hand equipment, much of which is still being utilised by the industry. These steps would ensure smooth flow and increased machine availability and utilisation.
- Calculating the unit cost of production (\$/tonne) for each of the machines on at least a quarterly basis. This means separate productivity and associated hourly cost should be calculated for



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each of the machines. This could be provided by the improved financial and production record keeping.

CONCLUSION

This study of “best performing” cable logging crews aimed at determining factors and characteristics that these crews had in common which affected their productivity and costs. While the crews were selected from a limited database, some useful observations and conclusions have been made.

Many factors were outlined by the individual contractors, and the common ones have been noted. Examples such as “out-of-the-box” thinking and innovation, good communication and proactive planning seemed to be a resounding theme that made a difference for these logging businesses. Such observations could provide useful tools to other New Zealand harvesting contractors.

Acknowledgements

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