

Chapter 7

Summary and Conclusions

Twenty-four logging businesses were sampled using the general systems approach. Study participants were a select group rather than a cross section of the contractor force shipping wood to the six research sponsors. They represent the top 25% of the contractors in the logging profession in terms of business size, professionalism, environmental performance and community relations in the eyes of a study sponsor. Treelength harvesting and good record keeping were also criteria for nomination inclusion.

7.1 Contractor Profiles

Contractors were mostly in their forties and fifties, although there appeared to be a younger generation between the ages of 29 and 35. The education level was high with all but two contractors completing high school and almost half attending at least some college.

The businesses varied widely in size, from 20,000 tons to nearly 250,000 tons per year with a median of 61,000 tons. The middle 50% of the sample businesses produced between 40,000 and 100,000 tons annually. The majority of the businesses ran single crews, with seven operations running two crews. Logging businesses in the mountains were the smallest, followed by piedmont then coastal plain operations.

Just over half the businesses had significant amounts of family employed. Family jobs tended to be smaller and organized as sole proprietorships, while the medium sized businesses were subchapter S corporations and the largest businesses were full C corporations.

Woods employees were compensated primarily on an hourly or production basis. A minority of contractors chose to pay general woods labor on a daily and salary basis.

However, key employees were often salaried. Owners of smaller businesses often served as equipment operators. As business size increased, owners' roles became more involved with strategic and long term planning and less involved with "hands-on" operations.

Most contractors hauled their own wood, with a portion of the trucking sub-contracted as needed. Five firms contracted out all their trucking. Five firms producing over 50,000 tons per year had incorporated their own separate trucking business.

7.2 Total Economic Efficiency

The annual cost and production information for twenty-three contractors was matched to calculate total economic efficiency ratios. A wide range of efficiencies and business strategies became apparent. This range was observed over different stratifications of the data set including time, amount of annual production, hauling strategy and physiographic region.

Tracking efficiency trends for a composite of loggers over time in a key objective of the study. Over the years of 1988 to 1994, individual contractors experienced year to year ups and downs in efficiency, but these changes did not seem to fall into a pattern. Average efficiency was highest in 1989, then declined in 1990 due in part to the addition of new contractors to the study. In the early 1990s, average efficiency tended to be stable. However, more recent data collected by Shannon (1996) comparing combined production and costs for 15 contractors for 1995 and 1996, indicate that costs stayed high while production fell sharply in 1996. This indicates some overall influence drove production and therefore efficiency down in 1996.

There were no obvious economies of scale across the 20,000 to 250,000 tons per year production range. However, dividing operations into three groups based on annual production showed that efficiencies at the highest level of production (greater than 100,000 tons per year) appeared to be less than efficiencies at the medium level (50,000 - 100,000 tons) and proved to be significantly different at the 90% confidence level. LeBel

(1996) and Shannon (1998) have observed that larger operations may be pursuing strategies of profit maximization, such that even if efficiency and profit margin percent are sacrificed at higher production levels, total profits are greater.

Several tests, termed “global analyses”, examined the impact of particular variables across all 109 contractor-years. The average annual haul distances for each load hauled to the mill ranged from 20 to 110 miles. While the haul distance to the mill showed a significant inverse correlation with total economic efficiency as would be expected, it explained only about 18% of the variation. There is little evidence of a pattern of how efficiency declines as haul distance increases from this scatter plot. It may not be a uniform or straight-line relationship. Instead there may be break points or steps related to how many loads per day a truck can haul, given day length, high regulations and gate houses.

The impact of percent pine harvested on an annual basis showed no significant correlation with total economic efficiency in the global analyses. However, weeks with higher percentages of pine had a significant positive correlation with weekly production in an analysis of seven operations for which detailed data were available. The slopes of these regression lines were not the same, indicating that some contractors had robust operations that were only slightly affected by hardwood, while others had more specialized operations that were more sensitive to hardwood. It was noted that “hardwood” implies more than a species difference. It likely includes less managed stands with difficult access on wetter ground.

Capacity utilization for each contractor was assessed based on a rule-of-thumb that the 75th percentile represents a sustainable production level, and therefore the mean divided by the 75th percentile gives an approximation of the average capacity utilization. However, this assessment did not prove to have a significant correlation with total efficiency in global analysis. The beneficial effect of increasing capacity utilization was better demonstrated on an individual basis using relative production-efficiency graphs.

A grouping analysis did not find a strong interaction between haul distance, percentage of pine and capacity utilization on total economic efficiency. Haul distance was clearly the dominant factor of the three. The impact of species mix by haul distance on total efficiency did not appear to be consistent.

Contractors were categorized as growing or stable, based on their production trends, equipment purchases and crew expansions. Growing contractors made significant gains in production compared to their first year in the study but appeared to experience volatile efficiency and some became less efficient than before growth, but possibly generating more pretax profit. Stable contractors tended to increase production at gradual rates and efficiency often tracked production gains. This is likely an indication of the positive correlation between capacity utilization and total efficiency.

The contractor-year observations were divided by hauling strategy. Those that hauled their own wood to the mill were categorized as cut-and-haul, while those who contracted out this service were described as logging-only. The logging-only group median efficiency less than the cut-and-haul and proved to be significantly different at the 90 percent confidence level. Contracting hauling causes the logging-only contractors to relinquish control over 33% (median) of their total costs. Also, it was noted that the logging-only contractors had an average haul distance of 40 miles compared to the 35 mile distance of the cut-and-haul contractors.

No powerful global impacts were apparent. It must be recognized, in any model that attempts to predict logging costs, that there is considerable variation in similarly equipped systems. Analysis that looked at individual performance seemed to be more understandable. How loggers respond to changes in environment and level of production is often specific to their business based on its niche and strategy.

Total economic efficiency increases by:

- 1.) increasing the outputs while holding inputs constant,
- 2.) decreasing the inputs while holding outputs constant,
- 3.) increasing the outputs at a faster rate than increasing inputs,
- 4.) decreasing the inputs at a faster rate than decreasing outputs.
- 5.) increasing the outputs while decreasing the inputs.

The first two means are rather simplistic ways to understand the economic efficiency ratio, in reality it may be impossible to hold outputs or inputs truly constant. Replacing marginal employees with equally paid but more capable employees, would be an example of the second means, which attempts to downsize or push cost control measures.

Improving capacity utilization is an example of the third means for increasing efficiency. If a contractor rarely feels the impact of quotas or other administratively induced loss of production, capacity utilization will increase.

The fourth means of increasing efficiency is used by downwardly elastic contractors. This type of contractor, by not reinvesting in new equipment, suffers some production losses, but decreases capital costs at a faster rate than production falls. Contractors with downward elasticity strategies tend to be smaller and run older equipment to keep efficiency levels acceptable when production is low.

The fifth means may be an idealized situation, even a contradiction, to think production increases and cost reduction can occur concurrently. The most innovative and successful contractors may consider ways to do both to try to become more efficient. "...The goal is not to reduce operational expense by itself. The goal is not to improve one measurement in isolation. The goal is to reduce operational expense and reduce inventory while simultaneously increasing throughput." (Goldratt 1992)

7.3 Partial Economic Efficiency

Total costs were broken down into six major categories: labor, consumables, capital, contract hauling, administrative overhead and insurance. Partial efficiencies, calculated as tons per dollars spent in each cost category, were used to compare the efficiency of expenditures in each category. Partial efficiencies were compared within the two trucking strategies: logging-only and cut-and-haul

The logging-only group had 41 contractor-year observations. Contract hauling was the largest cost category for 21 of these. These loggers spent 28% to 50% of total costs on hauling and had average haul distances of 40 miles and up. Labor was the greatest cost center for 18 observations, and consumables for two contractor-years. As loggers spent more in contract hauling, the spending in capital and consumables tended to decrease and labor stayed roughly the same. Though the study did not directly measure trucking costs, it appears that trucking costs breakdown heavier to consumables and capital than labor, unlike the woods-only operation.

The cut-and-haul group contained 68 contractor-year observations. Labor was the largest expense in 64 of these. The median of percentage of total cost spent in each category was: labor 42%, consumables 29%, capital 25%. While there was considerable variability about these medians, there was no apparent correlation between total efficiency and percentage spent in a category.

There appears to be an indirect relationship between percentage of costs spent in labor and percentage of costs spent in capital. The exact nature of this trade-off is unknown. Two areas where some flexibility is likely to occur is in mechanical versus manual delimiting, operator pay levels, and equipment replacement schedules. However, comparing cost allocation methods by total efficiency, there does not seem to be an optimum trade-off point. Labor remains the largest category, and efficiency seems to be limited by conditions and available technology.

7.4 Contractors' Stump

A variety of the issues touched upon earlier, can be illustrated with examples from interviews with contractors.

Increasing the percentage of pine harvested on a weekly basis was shown to improve production for a group of contractors, and many contractors had stated they preferred to cut pine. Of course, with percentage of pine harvested explaining less than fifteen percent of the variation in weekly production, other factors come into play. Contractors described situations where assumed tract or species benefits do not always materialize. One contractor said he has to be wary in contract negotiations not to let his rate drop as timber size increases. *They'll say 'these are big trees, you can get lots of loads.' But my loads are limited by my trucking.*

Another contractor, when asked about his preferred species, said: *I really don't have a preference. Pine chip 'n saw and logs are nice, but our best weekly production has been in smaller stuff, the key being we could haul everything we brought to the deck. I just would like it so that whatever we pull to the deck we can load on the trucks.* The logger was referring to species-product quotas. In some cases, these can be dealt with by selectively harvesting to reduce pile sizes on the landing, however even “sorting on the stump” can make the job more cumbersome and decrease production. Furthermore, several loggers noted that product quotas were especially frustrating if they necessitated moving off the tract.

Quotas in general are not popular with loggers. However certain aspects of quota administration are more problematic than others. *It is just a hassle over the quota every week. Every thing is last minute, you can't hardly plan. The forester calls at night or if you call up you may be able to get a few extra loads. You have to keep calling them back to get the latest update, to see if you can haul a few more...maybe on Friday they'll say haul all you want.* The logger was resigned to the fact that quotas were an inevitable part of the wood supply system management, but had this to offer about how he would

like the system improved. *Give me how ever many loads you're gonna give me, no last minute hassles and take it off my trucks when I get there.*

Other loggers pointed out the practice of daily quotas forced them to work in an inefficient mode. Often this meant getting the job going for less than a full day and loss of flexibility in harvesting a tract. *It is a daily quota, for instance this week: I could haul 1 load of hardwood pulp on Monday, 3 a day on Tuesday through Friday. They give me all these tickets to haul pine - Do you see any pine around here? - of course not and they should know that. Can I swap pine tickets for hardwood tickets with another contractor who is in a pine tract? No, - that would screw up their computer. What are they wanting me to do? - Set up clear on the other side of this tract twice a day to fill these tickets?*

Another logger said, *Too many times your field foresters are just too green to have a sense of how to manage a logger. They just don't know things because they lack experience.* He cited an example of an inexperienced forester giving him an inadequate quota to move a pile of wood, even though the forester had wanted him to get the pile to the mill.

High production is good, but six-day weeks on a regular basis may be too much. *We used to work a lot on Saturdays when [contracting firm] was in really dire need, but now we try to keep Saturday as maintenance day. When you work a Saturday like that it seems it gets everything off kilter. If you work six days all the time you get burned out. I am basically working 6 days a week. We work a longer day than most and I have guys that want to work even more. There's a lot of stuff I will let them do, the ones who want to work on the weekends. I like to get a lot of the water bars pushed up on Saturdays so it doesn't hold up the show when we go to move.*

All the loggers felt that best management practices were good for the land and good for the image of the profession. Some had concerns about certain modes of implementation, particularly those that decreased production. For example, one contractor said a BMP instructor had strongly discouraged the practice of pushing the clay mud off the road the

day after a rain. The contractor said this practice allowed him to work a day earlier than he could otherwise, and saw no harm in it, as long as the road was properly regraded in the end. *These guys don't know what it means to have to work.* Production is the only way this growing contractor can keep up with high capital costs.

There is a Spanish proverb that translates *It is not the same to talk of bulls as to be in the bullring.* The finances of a logging job are like bulls. This study has mapped some of the trends in efficiency and production, but there is no intent to predict logging costs or say how a logging business should be managed. One logger admonished, *You can put it all down on paper and try to make it work, but we come out here and make it work.*

From weather to quotas, hauling distances and tract conditions, mechanical problems in the woods and at the woodyard and other seemingly random events that break the flow of wood from stump to the mill, logging is a process fraught with daily production variation. Often this daily variation does not cancel out day to day but builds over the course of a week, as shown in the run charts. Loggers have to devote a tremendous amount of time and energy to not only do the work but when possible to adjust for the many things that come up quickly and almost unpredictably to rob an operation of production. The costs for the operation for that day or that week are already committed, the only way to improve efficiency in the short term is to utilize the operation's capacity to produce. All costs are fixed in the short-term; and all costs are variable in the long term. (Stuart 1998) Loggers must also contemplate the challenges of the future and plan for the long term. Primary considerations are how much production capacity to have and how to allocate costs.

A closing paragraph could attempt to condense what little is understood about the complexities of logging efficiency. Instead some closing comments from loggers provide some insights about how they got into logging, what keeps them in it, and issues that are of concern to them.

One of the loggers had a college education in forestry. He says he loves logging and enjoys the times when he is making good money. *I could find a job as a forester, and probably do just as well without all the hassles.* But looking at all the investment he has in equipment, *“once you get in this business, its hard to get out.”*

Ever since I was little, I always liked equipment. Daddy said I always loved tractors. I grew up in sawmilling and logging. It gets in your blood. That’s what they say and its true. Logging is a gratifying job. Its an honest living. You go out and work hard. We were raised in it.

I need to look at things different, if I can’t make it with what I got. Its no fun coming out here and doing it just for the sake of doing it. I love to work, I love to log, that’s my life, I love the woods. I would just as soon be out here as to be on the lake or to be in town or anywhere. I can’t keep doing it like I have been doing it the past year, because I’m losing money.

The biggest fear I had when I got into the logging business was having enough timber to cut, but that hasn’t been a problem, I have a very good relationship with the people I cut for. The problem is liability and regulations. I have nightmares about getting sued. You do your best to be safe and control the risks, but if an accident happens there’s a lawyer waiting in the emergency room.

I like being my own boss, that’s part of it. I like the challenge, getting the wood out. And the challenge never lets up.

My advice to somebody who wanted to get into logging would be not to.

I offered that advice to two guys who went broke. If a guy learns what a load of wood is worth delivered, it seems like a lot of money, and then he thinks all you have to do is cut the tree down and throw it on a truck, and get paid for it. What guys who want to get into logging don't see is all the hidden costs, unemployment tax, insurance, quarterly taxes. . . they have no idea what their workmen's comp rate would be. . . the only exception I would make to somebody getting into logging would be a young man who grew up in it, who knows how to work, who could take over a going operation and make it continue to work.

If you can get the financing, its the hardest debt you'll ever pay back in your life. Once you get in debt, you can't get out, because when its (the logging equipment) finally paid for, then it's wore out.

For the first 3 or 4 years getting started, you've got to work hard all the time, and reinvest every dime you make and you might be ok. When I started out, I had a 13 year old loader, two 12 year old skidders, the one Timberjack I must have had apart 18 or 20 times, 2 log trailers, one had been hit by a train. and a single axle Ford. I couldn't afford to send this stuff to the shop. I learned how to rebuild engines, though I never thought I could.

The companies think 'oh, he's just a logger, what does he need to know?' The logger is considered the low-man on the totem pole, when actually we are businessmen. We deal with the same things that the big company does: equipment, taxes, personnel, except its just on a smaller scale.