Montana Logging Costs 2013-An Engineering Approach

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Abstract

Montana’s forest products industry has changed significantly in the past decade. Decreased timber harvest, decreased employment in all forestry-related sectors, increased focus on ecosystem management and concerns of climate change, and an increased supply of smaller diameter timber have all led to important changes within the industry. Consequently, there is a need to update harvest-related costs across the board to reflect this shift in operations and to provide an easy to use resource for those interested in sustainable forest operations. The Bureau of Business and Economic Research (BBER) puts out logging cost data every two years; this data is based on expert opinion surveys sent to loggers in Montana and Idaho. Costs are calculated by identifying several timber harvest scenarios where loggers give their best estimate to what it would cost them to complete these scenarios. There has been a need identified to validate these responses by means of collecting fixed and variable costs for everything from total machine costs (including insurance, maintenance, depreciation values, etc…) to labor and other operating costs. While this information does already exist in several venues, it does not formally exist in a setting specific to Montana. To accomplish this, equipment dealers, insurance agencies, labor bureaus, county tax authorities, and loggers in western Montana were interviewed during the late winter/early spring of 2013. Costs were assembled in a spreadsheet and will serve as a means to validate survey responses for the upcoming round of production-level logging cost estimates developed by the BBER.

Introduction:

The field of forestry has long been one of Montana’s foremost industries and our state has historically had a significant role in the Northwest’s important forest industry. The industry has, of course, changed significantly from its early days, and is much different now than it was even twenty years ago. Harvest volumes have decreased by 64% since 1993 and consequently, so too have employment numbers (11,895 workers in 1993 to 6650 in 2012) and sales revenue from finished product (71% decrease) (Morgan et al. 2013). These factors combined with new ideas on how best to manage the nation’s forests have significantly altered the nature of Montana’s forest industry. To remain competitive and in touch with contemporary forestry issues, the industry in

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Montana must maintain and update its knowledge and data regarding logging cost and subsequent continued feasibility.

Over the past century, the industry has seen many ups and downs. Technological advances have greatly improved logging equipment efficiency, but have also led to increased costs across the board. In a sense, a “teeter totter” is a relevant symbol to illustrate swing in costs and revenue. That is, as logging costs increase, returned revenue decreases (generally) (Mathews 1942). The initial investment in a piece of new logging equipment has increased, as have fuel, oil, and maintenance costs. The cost of labor has followed a similar trend as have worker’s compensation rates and general benefits to employees (Morgan et al 2013). At the same time, this modern equipment is faster and more efficient allowing for increased production, decreased fuel usage and emissions, and decreased need for human labor. These advances allowed by technology have been further stifled by the economic situation that Montana’s timber industry faces. While advanced technology does exist that has the capacity to potentially improve harvest efficiency, whether or not this modern machinery is worth the investment is a concern of considerable measure for today’s logger. Consequently, loggers and forest managers need to be aware of the costs associated with logging to be able to better handle their own future situation.

**Justification:**

The BBER has produced logging cost data for roughly 15 years, filling a gap left by the US Forest Service (USFS). To construct these cost estimates, the BBER surveys logging professionals in Montana and Idaho on a two year rotating basis. These surveys identify several scenarios among different harvest systems, a silvicultural prescription is given, and the logger is asked to prepare a cost estimate or bid based on these scenarios. This data is returned to the BBER where costs are then analyzed and reported.

There are several needs relevant to maintaining this logging cost data provided by the BBER. First is the need to both enhance and update knowledge on daily and hourly equipment and labor costs to act as a validation tool for the survey data returned by loggers. Second is a need to compile this data to be able to offer to loggers, forest managers, and private landowners a tool to estimate these costs “across the board”. It is generally accepted that logging costs are inherently variable due to the many factors affecting the overall process. However, being able to offer at least a baseline of average costs could be a useful tool for estimation, as well as comparison between types of equipment.

Equipment and labor cost estimates have been produced in a variety of formats across the U.S. (SRS calculator, Charge-Out, various “homemade” costing spreadsheets, etc…) (USDA n.d., Bilek 2008, Brinker et al 2002). However, it has been many years since data was collected specific to the Rocky Mountain region and consequently, local loggers and managers may question the applicability of using this cost data in our own locale. Equipment and labor costs were kept regularly by Montana’s commercial timber industry through the 1980s, though this data has been...
collected (or at least reported) less frequently with the downsizing of the industry. Thus there is a need to update this data to better serve the needs of those remaining, and to serve as a comparison to cost data from 20 years ago.

The ultimate goal of this report is to compile updated, local cost estimates for equipment deemed representative of equipment currently utilized in Montana, as well as regional labor estimates. Comparisons will be made to historic cost data specific to Montana. Future research needs are also identified, as the scope of this paper was limited by time and resources.

Methods:

For this project, we utilized equipment cost data produced roughly 20 years ago by Champion Timberlands, one of Montana’s major timber companies. We attempted to replicate the format used in the historic data source almost exactly to maintain a sense of continuity between estimates. The original source had logging costs broken down in “typical engineering format” applied to the costing of individual pieces of equipment across harvest systems and include the break-out of fixed and variable costs. Specific costing aspects of each system were then broken out individually into fixed and variable costs (Caterpillar 2001, Matthews 1942). Production estimates were not included in the historic data, and consequently are not included in this report either.

The equipment costing aspect of this report relies primarily on local expert opinion and data in the form of equipment specification and cost sheets. Two equipment dealers in western Montana were contacted and direct interviews were conducted with the individual in charge of forestry equipment sales at each (Jones 2013, Ployhar 2013). These dealers were chosen based partly on accessibility, but mainly due to their respective brand of machinery being identified as a “major” participant in the local equipment industry. The question was posed to each individual as to what type of equipment is being commonly purchased and utilized in Montana today. Each equipment dealer offered to produce costs for what they considered a full, commonly-utilized “side” of a mechanical logging operation including a feller-buncher, skidder, processor, and log loader. Cost and specification sheets were furnished for each machine. In addition to data furnished by equipment dealers, insurance, tax/depreciation, maintenance, oil/lube, tires and chains, and other associated data was collected from local city and state governmental agencies.

To retain a sense of locality, “rule-of-thumb” methods from expert opinion were used to account for as many equipment cost categories as possible. While we were not able to account for each one, we were able to garner information on fuel usage, oil/lube, and maintenance costs (Jones 2013, Ployhar 2013). Otherwise, methods were used from other published sources (Brinker et al 2002, USDA n.d.). All of these costs were put in Microsoft Excel and “crunched” to produce daily and hourly rates.

Labor costs were assembled using Federal wage data, as well as Worker’s Compensation, other insurance data, and other associated costs from city and state agencies, local insurance
dealers, and the Montana Logging Association. Similar to the equipment costing, these numbers were “crunched” using Microsoft Excel.

Upon completion of the compilation of cost data, several local loggers were contacted and interviewed to offer input on the validity of these costs. Their input was taken into consideration and added to the Spreadsheet as applicable.

For the sake of comparison, current data was compiled and produced in a format similar to the past report. These historic costs were then inflated to current year dollars using a currency inflator provided by the BBER to aid as a comparison tool.

Assumptions:

Logging costs are incredibly variable due to numerous factors; however, we hope to offer an average cost representative of Montana’s timber industry today. Several assumptions are necessary to compute this estimation:

- A 180 day working year with 36 weeks of work (5 day week)
- A 9.5 scheduled machine hour (SMH) day with 1.5 hours of overtime for equipment, and 8.0 SMH for sawyers
- 8.5 productive machine hour (PMH) per day
- Diesel fuel at $3.50 per gallon (off-road diesel)
- Insurance 1.30 per $100 (quote from PayneWest Insurance; based on 60% of new replacement value
- 6.5% interest-financing
- 3% administration cost
- 150 mile per day roundtrip for crew transportation costs

Results:

Table 1-Logging Cost Comparison between 1993 and 2013

<table>
<thead>
<tr>
<th>Operation</th>
<th>1993 Total Side Per Day (Inflated to 2013 dollars)</th>
<th>2013 Total Side Per Day</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawyer</td>
<td>$333</td>
<td>$345</td>
<td>4%</td>
</tr>
<tr>
<td>Loader</td>
<td>$706</td>
<td>$1,053</td>
<td>49%</td>
</tr>
<tr>
<td>Tired Skidder-Large</td>
<td>$632</td>
<td>$1,123</td>
<td>78%</td>
</tr>
<tr>
<td>Track Skidder-Large</td>
<td>$734</td>
<td>$1,123</td>
<td>53%</td>
</tr>
<tr>
<td>Feller Buncher</td>
<td>$1,001</td>
<td>$1,277</td>
<td>28%</td>
</tr>
<tr>
<td>Processor</td>
<td>$945</td>
<td>$1,080</td>
<td>14%</td>
</tr>
</tbody>
</table>
The table above illustrates cost data from our historic source (column two) and data from our updated costing exercise (column three) utilizing local information for one complete mechanical logging side including operator wages specific to Montana. In regards to the contemporary data, costs were averaged across machines of comparable size, horsepower, and attachment type to produce a singular cost. As producing detailed costing data for different equipment was one of the goals of this project as means of validation for other research, more detailed data does exist internally and is available upon request.

Discussion:

As illustrated above, the cost of running a total side in Montana has significantly increased over the past 20 years beyond inflation. Based on comparison to past data as well as anecdotal interviews with logging professionals, the biggest increase in costs purportedly has been in the purchase price of new equipment, diesel fuel prices, and the increased price of steel. Ultimately, our comparative data suggests that the costs of purchasing and operating equipment are huge factors in the overall increase in logging costs.

To compare initial purchase price between 1993 and 2013, costs were averaged for all equipment between years. It was found that average initial price jumped from $226,330 (inflated) in 1993 to $430,409 in 2013, an increase of 90%. However, comparison between equipment purchase price from our historic data and contemporary data proved challenging based on several factors. Most notably, equipment utilized today is mechanically and technologically much different than 20 years ago. There were observable differences in both weight and horsepower between data sets, with modern equipment having a range of 12-122% more horsepower, thus contributing to increased fuel usage, oil/lube, maintenance, and initial purchase price. Ideally this increase in power would equate to an increase in productivity, though the increase in purchase price might offset the production benefits of purchasing new equipment.

In addition to increased engine power, changing emissions standards have also arguably influenced the initial purchase of logging equipment. Federal emissions standards have been in place since 1994, with several changes occurring since (EPA 2013). These regulatory changes have and will require alterations to equipment engines in the form of advanced emission control technology, but there is a disparity in how much impact this will have on initial purchase price. This range is from a 1% increase up to 30% based on our interviews with local equipment dealers (Dieselnet 2013). Despite the variability in this range, it will be important for logging professionals to be considerate of these changes into the future.

While the mechanical side of logging equipment has changed significantly, there has also been substantial improvement in on-board technology. Most modern equipment has advanced computer systems capable of determining and processing different cut log specifications, and then storing production data for future use. For instance, John Deere is now offering an optional program they call JD Link technology that wirelessly enables mill operators to set cut specs in the
mill without having to implement any changes on the machine (Jones 2013). This program also monitors how the machine is operating mechanically and when maintenance is required. Other companies offer similar services, thus ideally enabling loggers and mill operators to interact more seamlessly and improving overall efficiency. Yet, similarly to mechanical advances, there is an underlying cost associated with this improved technology that may be of further consideration when purchasing new equipment.

As stated above, the purchase price of new logging equipment accounts for a large portion of overall cost difference between our historic and contemporary data. However, other factors were brought up during conversations with our interviewees. First, the number of annual days a logger works has decreased over the past 20 years. This is due to a variety of factors, most notably market influences on consumer need and the availability of a consistent supply of timber, and consequently the work availability for loggers. Also, yearly climatic patterns influence the amount of operational days, whether it is an extended spring break-up, or a forest shut down for extreme fire danger. A second influence (and tied to the first) is the increased driving distance to get to a job site. A consequence of decreased logging employment and mill facilities means the same area is covered by fewer contractors, thus those remaining must travel further. This results in increased fuel usage and vehicle maintenance costs and becomes more prevalent on overall operational costs. A final influence is in regards to generally changing make-up of the logging contractor workforce. It’s been noted in several recent publications that the logging sector is becoming increasingly older (Allen et al 2008). This is having an effect of all associated labor costs including hourly wage, worker’s compensation rate, social security, and other associated taxes. Upcoming changes in the Federal health care mandate will further increase labor costs, though the exact influences are unknown at this point.

Conclusion:

Ultimately, the costs of logging have increased substantially in comparison to data from 20 years ago. While this isn’t surprising, it does serve as an important reminder for those involved in Montana’s logging industry. While the local economy has seen an upswing in past months, the variable nature of the forest products industry holds our own local economy in a tenuous position. While these external factors certainly play a large role in industry’s future, the mere cost of operation may “make or break” an operation. Thus, it is beneficial to constantly update and maintain logging cost data to help ensure the continued success of this vital industry in Montana.

Future Research Needs:

As a result of time limitation, as well as access to data, several aspects of this costing exercise were excluded. Most noticeably, no cable logging equipment was included in this iteration. This is due mainly to the lack of new yarding equipment being bought and sold in the local area. While cable logging is still an important part of Montana’s logging sector, most equipment dealers are not selling new equipment locally. That said, it is currently planned to carry
this project forward and collect cable logging equipment costs from the remaining local contractors
still using this equipment. Also excluded from this report were production values to equate daily
cost to cost per ton or board foot, though this is also planned for the next iteration. As a result of
the recent upturn in the price of delivered logs, there has been renewed local interest in the use of
helicopter logging. Including this data in future research will be addressed based on apparent local
interest and availability of infrastructure to provide data. Additionally, comparisons will be made to
data from other regions in the United States to assess applicability of utilizing costing tools from
other sources.

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