Article

Characteristics and Concerns of Logging Businesses in the Southeastern United States: Results from a State-Wide Survey from Alabama

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Abstract: A mail survey of Alabama logging firms was conducted in collaboration with the Alabama Loggers Council (ALC) in the spring of 2023 to gather data for current and future assessments of the logging industry’s status and challenges. The response rate was 23.02% after two mailings. The average age of the business respondents was 56 and the average age of employees was 48. About 35% of owners expected to exit the industry within five years, with one-third of those reporting that their business would cease to operate. Most owners who plan to continue operating after five years expect to maintain the same production level. The primary challenges facing logging businesses are increasing operating and equipment costs, the lack of labor and truck drivers, and mill issues (including quotas, shutdowns, and slow operations). COVID-19 has had some effects on Alabama logging operations, including reducing production for a majority of businesses.

Keywords: logging industry; survey; demographics; challenges

1. Introduction

Alabama has the third largest area of commercial forestland in the United States at over 23 million acres. In 2021, almost 41 million tons of wood were harvested, providing for 11.4 billion dollars in local economic impact from the forest products industry supply chain [1]. Alabama leads the United States in loblolly pine stock volume at 600 million tons and exports raw and finished wood products totaling over $1.5 billion internationally on an annual basis [1]. This places Alabama as an important producer of timber and wood products, not just for the United States but for the world.

Most timber in the state is harvested and transported by a logging industry comprised of independent logging companies that provide a crucial link in the forestry supply chain between the stumpage in the forest and the milling and manufacturing of wood products. The forest products supply chain usually consists of forest landowners (private, industrial, or financial owners) who get advice and management planning from consulting foresters. Timber procurement agents (generally loggers, mill procurement agents, or wood dealers) have contracts with logging businesses to harvest and transport the timber purchased from the landowners. These agents transport the timber to mills (sometimes using contract truckers), which process the timber into a variety of wood products [2–5].

Logging companies provide the front-line, physical implementation of forest management prescriptions (such as thinning, salvage cutting, and harvesting) that require skilled labor and specialized machinery to (generally) bring timber from the forest landowner to the mill to be processed; because of this, the logging industry is a major source of forest industry employment [6]. The relationships that logging companies build between the various forestry supply chain stakeholders can determine their opportunities for timber harvesting and hauling. For example, two of the most important relationships are between logging crews and mills and between logging businesses and wood dealers. Mills, for
instance, can impart preferred-supplier status on logging crews that prove to be valuable to the mill. The preferred-supplier arrangement became popular in the 1990s. Mills hoped that preferential arrangements with particular logging teams could help retain good logging crews for procurement purposes and help reduce volatility in supply. Such crews could work more efficiently and with less free capacity (due to higher quotas and reduction in regional movement) and less downtime compared to non-preferred crews. These circumstances would allow the crews to deliver more timber to market, leading to a lower cost per unit volume [7]. Wood dealers are independent brokering businesses that act as intermediaries between mills and logging businesses. The logging businesses buy or arrange the purchase of timber through harvesting and hauling contractors. Wood dealers have a long history harkening back to outside investment in southern US timberlands and mills that required local knowledge and experience [5,8,9]. Wood dealers can hold considerable power in an area, as they can determine the size and location of timber tracts which they contract out to specific logging businesses. A majority of logging businesses in the southern US still rely on the wood dealer system for access to timber for delivery to local mills [10]. The continued reliance on a middleman for access to timber processing is not unusual for an industry traditionally seen as slow to change especially regarding social and environmental pressures [11,12].

The logging and forestry literature describes a variety of challenges that the logging industry has been facing historically and in recent years, including (1) an aging business ownership [10] with a lack of succession planning [6,13]; (2) trucking and employment shortages with little effort to entice new and young individuals into the profession [10,14]; (3) mill issues (such as quotas and uneven relationships) [15,16]; (4) increases in operating, equipment, and labor costs [17]; and, most recently, (5) the impact of COVID-19 on individual companies and the industry as a whole [18,19]. Understanding how these issues emerge and change over time and the importance and priority placed on them by logging business owners can help us better assess how the health, status, and needs of the logging industry are evolving, and whether educational, policy, or economic interventions have had any effects.

Challenges to the logging industry in the southeastern US are often shared internationally with other countries that have similar modern timber business environments. For example, similar issues with employee age are found in Canadian logging firms [20]. The interest in recruitment to the logging profession varies across countries, with Canadian loggers indicating a lack of enticements [20] and South American firms seeing more interest from potential employees [21]; this indicates that the economic environment, the overall availability of jobs, and the reputation of the profession play roles in enticing new employees into the industry. Operating costs, equipment costs, and government regulations (particularly those that favor larger firms or are outdated by rapid industry growth) are concerns found across the world in countries with older timber industries, as in Europe [22], and in countries with new or developing industries, as in Asia [23,24]. Timber theft can be another challenge for the logging business; however, this is a far less impactful issue in the United States [25] than it is in countries with less rigorous enforcement of rights and regulations, such as in South Africa [26]. Less developed industries, as in Eastern Europe, struggle with industry investment for modern equipment, leading to the inability to reach full production capacity [27]. Another major issue for developing nations, particularly in Africa, is foreign sourcing and competition with local industry that can lead to less local employment and unfair competition from firms with much greater capital [28].

Regional studies of these challenges and concerns within the forestry supply chain are important because of the nature of the supply chain and the localized relationship between its stakeholders [29]. There have been several surveys of the logging businesses in the southern US, including states such as Georgia, South Carolina [10,15], and Alabama [30,31]. Many similarities in tree species harvested and timber harvesting, wood procurement, and mill operations in the Southeast make a comprehensive study applicable among states in that region. However, local economics, industrial infrastructure (such as the location of
mills), and state-level politics and policy can also affect business practices. In addition, this is an industry that can have significant changes over time [10], and there is a lack in the literature of specific recent surveys of Alabama logging firms, particularly post-COVID. Furthermore, local and regional studies can provide data points for meta-analyses that can cover more comprehensive global issues affecting the timber industry from international perspectives (e.g., [32]).

This paper documents a study (conducted in collaboration with the University of Georgia and Clemson University) using an updated survey instrument from their long-running five-year-interval logging business study [10], the goal of which was to create a demographic profile of Alabama logging businesses and report on the most important challenges that these firms have identified. This study will help to create a reference for regional industry information that can provide opportunities for future studies to assess how the Alabama logging industry progresses over time and allow comparison of industry trends across the southern US and the world.

2. Materials and Methods

A survey of Alabama logging firms was conducted in the spring of 2023 in partnership with the Alabama Loggers Council (ALC), a subsidiary of the Alabama Forestry Association, which represents and advocates for the logging industry in Alabama. The ALC provided its membership list as the sampling frame and coordinated the mailing, receipt, and storage of all the responses. This study was approved by the Institutional Review Board (IRB) of Alabama A&M University. The sample included a total of 283 individual businesses, about 52% of the estimated 546 establishments, in the fourth quarter of 2022 from the Bureau of Labor Statistics [33]. The survey was mailed out at the beginning of February 2023, and a second mailing was sent out one month later to nonrespondents. To reduce the effort required for logging owners to respond, the survey was limited to the front and back of one standard 8.5′′ × 11′′ page with a cover letter explaining the nature of the study. A postage-paid envelope was included with each mailing to reduce costs for respondents. Responses were sent to ALC and then inputted into Excel for analysis.

The two-page instrument used was based on previous surveys completed in the region [10] and included open-ended, multiple choice, and Likert-scale questions regarding several categories such as demographics (owner age [open-ended], tenure [open-ended], education [Likert-scale], etc.); business challenges (problems faced [open-ended], access to credit [Likert-scale], profitability [Likert-scale], etc.); company profile (number of employees [open-ended with multiple categories]; average employee age [open-ended]; number of crews [open-ended], etc.); timber harvesting (type of trees and products [multiple choice]; how timber was purchased [multiple choice], etc.); and some miscellaneous questions including the impact of COVID-19 [multiple choice] on the owner’s business.

2.1. Bias Testing

Two weeks after receiving the final survey, we called random logging businesses from the ALC business listing. We inquired with each call if they had returned the survey; for those who had not returned the survey, we asked three questions from the survey (owner age [open-ended], percentage of pine harvested [multiple choice], and number of logging crews [open-ended]). We then compared the nonrespondent answers to the survey data with independent sample t-tests to check for potential biases. We also compared early (first 25%) and late (last 25%) responders on the basis of the study by Armstrong and Overton [34].

2.2. Software

The survey results were entered into Microsoft Excel 365 for graphing, table building, and basic statistics. For numeric responses, we calculated means, medians, standard errors, and 95% confidence intervals using formulas in Excel. Open-ended responses, such as questions about business challenges or counties where harvesting was performed, were
coded into different categories based on the type of answer or issue provided. Statistical tests (t-test) for non-response bias were conducted using Stata 18 [35].

3. Results and Discussion

3.1. Survey Response

We received 69 responses from across the state of Alabama. Five responses indicated that they did not currently own or manage a logging business and were removed from the sampling frame. Adjusting for the removal of those businesses, we shifted the sampling frame to 278 valid businesses, providing a final response rate of 23.02%, similar to Conrad et al. [10] and other logging surveys in the United States [15]. Statistical testing indicated that responses from interviews with nonrespondents contacted by telephone (n = 10) and those from survey results had no significant differences for any of the three shared questions (p > 0.5). We also did not detect significant differences with statistical tests conducted between early (first 25%) and late (last 25%) responders on those same questions (p > 0.5).

Using Alabama Forestry Commission county-level harvest data [1], which divides the state into four regions (northwest, northeast, southwest, and southeast), we calculated the percentage of the total state timber harvest taken from each region. We then calculated the percentage of our responses for each of these regions using the counties from which the respondents said they last harvested. We compared the data by region to examine the potential representativeness of our survey sample (Figure 1). Our survey response divided into separate regions shows close alignment with timber harvest percentages, providing evidence that our survey sample is not biased toward a particular area of the state or out of line with known harvest activity.

Figure 1. Comparison of percentage of total harvest and percentage of total survey respondents by Alabama Forestry Commission State Regions.

3.2. Demographics

In Alabama, the average logging firm has around 12 employees, about 4 of whom are truckers, and between 1 and 2 of whom are related to the owner (Table 1). Alabama logging businesses generally run between 1 and 2 crews (1.7 on average), identical to Carlos et al. [32] who used Alabama logging firm interview data collected from 2011 through 2018.
Table 1. Logging business characteristics in Alabama (2023).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>95% CI (±)</th>
<th>Median</th>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>Number of Employees</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Employees per firm</td>
<td>12.4</td>
<td>2.83</td>
<td>8</td>
<td></td>
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<tr>
<td>Truck drivers per firm</td>
<td>4.3</td>
<td>1.3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Number of Crews</td>
<td>1.7</td>
<td>0.39</td>
<td>1</td>
<td></td>
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<tr>
<td>Relations between Owners and Employees</td>
<td></td>
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<td></td>
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<tr>
<td>Employees related to owner</td>
<td>1.5</td>
<td>0.39</td>
<td>1</td>
<td></td>
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<tr>
<td>% firms employing relatives</td>
<td></td>
<td></td>
<td></td>
<td>31.20%</td>
</tr>
<tr>
<td>Ages of Owners and Employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner age</td>
<td>56.2</td>
<td>3.05</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Years of owning or operating a logging business</td>
<td>25.7</td>
<td>3.47</td>
<td>24.5</td>
<td></td>
</tr>
<tr>
<td>Avg. employee age</td>
<td>48.2</td>
<td>2.1</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Difference in Age (Owner–Employee)</td>
<td>8.1</td>
<td>3.24</td>
<td>9</td>
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</tr>
</tbody>
</table>

The owners have a mean age of just over 56, with 38% of businesses having owners 60 or older (Figure 2). The owners have a median tenure of 24.5 years of operating or owning their logging business. The reported average employee age is slightly younger at 48.2, with 8% being 60 or older. There was an average difference of 8.1 years of age between owners and their average employee (p < 0.05). The issue of aging logging business owners is well documented across the southeastern United States and the rest of the nation [6,10,13,17] and has been a growing concern, with the average age of logging business owners consistently increasing over the last few decades.

Figure 2. Percentage distribution of owner and employee age for logging firms in Alabama (2023).

The percentage of Alabama business owners with completed college degrees (30%) tracks with the 32% reported in Georgia (Figure 3) but is higher than that reported in South Carolina (<15%) [10]. Likewise, the majority of respondents (69%) completed high school
but did not complete a college degree. Other studies have noted the lack of formal education in the logging industry, with most knowledge originating from on-site experience [36]. The obtained level of education could explain the lack of use of more advanced technology from respondents, with only 36% using computer mapping, 42% using GPS technology, 12% not using email, and 23% not using the Internet as part of their business (Figure 4). If their skills and experience are derived from on-the-job training, and their job is not already using these technologies, they will not be exposed to their usage as they would generally have been in a college curriculum. Furthermore, given the higher crash rates among log truck fleets in the southern US [37], the 47% of logging businesses that do not use dash cams (Figure 4) should consider installing them for liability purposes and to potentially lower insurance premiums [37]. The literature shows the potential for large decreases in traffic accidents due to safety awareness created by using dashcams in the trucking industry [38].

![Figure 3](image1.png)

**Figure 3.** Education levels of logging firm owners in Alabama (2023).

![Figure 4](image2.png)

**Figure 4.** Technology used by logging firms in Alabama (2023).
3.3. Harvest Characteristics and Production

All Alabama respondents delivered tree-length materials, and 89% delivered log-length wood (Figure 5). These percentages are similar to reported delivered products in both Georgia and South Carolina in 2017 [10]. Given the improved value extraction for tree-length products [39,40], the preference for tree-length material for pulpwood [10], and the COVID-19 impact on sawtimber prices [41], this was not surprising. No Alabama logging business surveyed reported delivering clean wood chips, with only 2% delivering dirty chips. This is not unexpected for Alabama, given that only 39% of the respondents reported a market for energy wood in their area, and given the high costs associated with producing chips because of poor market demand [42].

![Figure 5. Percentage of wood products reported delivered by Alabama logging firms (2023).](image)

Wood dealers were the primary source of timber for Alabama logging businesses (Figure 6). This is similar to other southern US states, where the system allows logging crews to operate at larger and more even production capacities but often at higher overall costs and with less direct control of harvest job selection [7,10].

![Figure 6. Percentage of primary timber source for Alabama logging firms (2023).](image)
The low percentage of harvesting directly from owned timberland (14%) correlates with the recorded historic timberland divestment from large vertically integrated forest product companies in the southern US [43]. Indeed, timberland purchases from financial and investment entities including timberland investment management organizations (TIMOs) and real estate investment trusts (REITs) have overtaken large corporate land ownership in acreage across the United States, with Alabama having the second highest acreage after Maine [44].

3.4. Business Challenges

Respondents stated a variety of different concerns, issues, and challenges that currently face them. These responses were coded into nine different categories on the basis of the general source and type of issue (Figure 7). For example, complaints about mill quotas were coded as “mill issues”, while concerns about employee hiring were coded as “labor availability”. Alabama logging businesses expressed that the top five challenges currently facing their firms were: operating costs (fuel and wages) (38%), equipment costs (20%), trucker availability (19%), and mill issues (quota, speed, and outages) (19%).

![Figure 7. Percentage of Alabama logging firms identifying a challenge to their business (2023).](image)

Operating costs, including wages and fuels, were the most often cited concern from logger business owners. Rising fuel costs during 2022–2023 reached unadjusted prices higher than any weekly period since 2008 [45]. This inflation in fuel costs can lead to various reactions from logging firms, from increasing production based on price increases of forest products to lowering production due to increased costs to extract those products [46]. Likewise, wages have increased, pressured by low unemployment, with the COVID-19 pandemic compounding the issue [47]. He et al. [12] demonstrated that wages are a significant component of total firm costs (30%) in the southern US, with wage increases averaging 3.18% a year. Additionally, logging firms can have difficulty attracting new employees due to the intrinsic nature of the profession (hazardous environment, high physicality, lower salaries, etc.) [6,14,17].

Logging businesses in the southern US have historically favored the adoption of new technology and machinery to maintain or enhance production levels in the face of labor shortages [48]. However, the cost of the specialized machinery that allows for operating at the same production efficiency with lower employment in logging crews continues to increase due to various factors including global supply chain issues [16].
Logging employment numbers across the southeastern US and the US as a whole have been decreasing for many years [14,15,17] as logging firms have consolidated and mechanization has increased productivity. In addition, a decrease in familial ties to logging businesses [10,15] can lead to less attachment to or direct succession in the profession. Further, labor shortages in the logging industry are mostly of trained and highly skilled labor, making replacement more difficult, especially for equipment that requires extensive experience for proficiency [14,49].

Truck driver shortages have been an issue across general US industries for a while [49], particularly in the logging industry [37,50,51]. There are indications that the worst of the shortage has not been observed yet [52]. The shortage is complicated by the already general labor shortage identified by logging firms and the increasing costs of insurance for the trucking industry [29].

Only 14% of logging businesses in Alabama did not have at least one truck driver on staff, and a large majority (72%) of respondents indicated that they use contract trucking to some extent (Table 2). The use of contract trucking can sometimes be more cost-effective than in-house hauling; it can reduce the downtime in which company trucks wait for loading and can allow for the hauling of more wood with the same number of trucks compared to logging-business-owned fleets [53]. In other cases, contract logging can actually reduce efficiency for preferred suppliers using their own trucks to harvest more of their weekly capacity [7]. Of those using contract trucking in our study, most (about 60%) hauled 50% or less of their loads with external trucks. A little less than 30% used non-employee truckers for more than 75% of their loads.

Table 2. Contract trucker usage by Alabama logging firms (2023).

| Percentage of firms without truck driver employees | 14.10% |
| Percentage of firms using contract trucking | 71.88% |
| For firms using contract trucking, percentage of loads hauled: | |
| Less than 25% of loads | 42.60% |
| 26%–50% of loads | 17.00% |
| 51%–75% of loads | 10.60% |
| More than 75% of loads | 29.80% |

Mill issues including low prices and payments, outages and slowdowns, low or strict quotas, procurement problems, and preferential treatment of some logging companies were frequently cited as challenges. Mill quotas, in particular, are a historic complaint for logging businesses throughout the US [7,10,16,18] and have been for many years. These quotas present a market-based cause for underutilized production capacity for logging business crews, indicating that there is an oversupply of available timber within the area. In addition, several respondents directly mentioned as a business challenge the lack of procurement or supply opportunities from mills themselves, which could be related to the 6% low mill primary sourcing response (Figure 6).

When asked if any of their crews were preferred suppliers for a mill, only 46.9% of the businesses reported having a crew with preferred status; 15.6% of these had more than one crew that held preferred status by a mill. The preferential treatment offered by the preferred supplier status led several respondents to complain about the nature of arrangements that force them to operate through a wood dealer or buy wood themselves instead of working directly with a mill. We can see this side-effect with most Alabama logging businesses operating through wood dealers, with only 24% operating directly with a mill (Figure 8).
The above challenges have been identified as key issues for the logging industry for years, if not decades [15]. However, the recent COVID-19 pandemic has had unanticipated impacts on the industry. About 56% of Alabama logging firms reported that they had to reduce production due to the pandemic, with 41% indicating that at least one employee had contracted the virus and 9% reporting at least one death from their firm from the illness (Figure 9). COVID-19 exacerbated the challenge of labor availability for 22% of Alabama logging firms.

![Percentage of Alabama logging businesses operating through wood dealers, TIMOs/REITs, or directly with a mill (2023).](image)

**Figure 8.** Percentage of Alabama logging businesses operating through wood dealers, TIMOs/REITs, or directly with a mill (2023).

COVID-19 and the policy responses to it had a variety of impacts on the timber and lumber markets, with increasing demand for wood products constrained by restricted supply because of lower productivity, supply issues, and work restrictions [54]; these
impacts have been felt across the southern US [55,56]. The effects on industry employment and mill activity within the supply chain were generally temporary and were improving by the third quarter of 2020, with increased lumber demand promoting a recovery at the end that year [29]. The early designation of lumber industry employees as “essential” workers by state and US government agencies and government assistance payments from the Paycheck Protection Program and Pandemic Assistance for Timber Harvesters and Haulers likely also helped to blunt some of the economic impacts [57].

3.5. Business Outlook

On average, Alabama logging business owners felt that their ability to access capital was somewhat easy (mean = 2.05 ± 0.297 (95% confidence interval) on a Likert scale where 1 = very easy and 5 = very hard). They rated the profitability of their business as a little less than average or break-even (mean = 2.82 ± 0.269 (95% confidence interval), on a Likert scale where 1 = very poor and 5 = excellent). These data paint a picture of an average-to-break-even financial state for Alabama logging firms. Access to capital is crucial in a logging business’s ability to purchase or upgrade machinery, increase capacity, and remain stable in the face of challenges [58,59]. The profitability of logging firms is tied to overall financial conditions, with direct correlations to housing starts, renovations, and other high-timber-demand activities; it has been steadily recovering since the 2009 recession [1,17]. Profitability has been buoyed in recent years by the increased demand for lumber for home improvements from stay-at-home workers during the most difficult months of COVID-19 across the United States [29].

Only 65% of the respondents expected to still be in the logging business in the next five years. Of those 35% of respondents that stated they were likely to exit the industry in the near future, 36% reported that a family member would take over, and 32% said their business would cease to operate. Nine percent of owners would sell their firm to a business partner or employee, and another 9% would sell their business to an outsider. About 14% of the respondents expecting to leave the industry did not list a plan for succession or termination of the company. There is a question of who will inherit the operation of logging businesses in Alabama as owners retire in the next few decades; only 31.20% of firms employ relatives who would have the experience to take over the business, and the average employee age is just slightly lower than the average owner age (Table 1). The lack of succession planning and the aging logging workforce provide for an uncertain future for logging businesses across the United States [6,13].

For respondents who reported that they plan to remain in their business over the next five years, 60% said they would maintain the same production level, with 42% stating they would increase production. These numbers demonstrate some degree of optimism about the ability and desire to overcome current business challenges in the immediate future of the Alabama logging business. This optimism is reflected in recent state agency reports of recovering timber harvests, high housing starts, and record lumber prices [1].

4. Conclusions

This study has provided a needed and updated demographic and business snapshot of the Alabama logging business in 2023. The picture provided is similar to other states across the southern US, suggesting that business practices, concerns, and demographics are widely shared across the region. In fact, 17% of our respondents reported that they also operate in one of the surrounding states. This is helpful, as it allows regional government agencies and industrial groups to work together to find solutions to the challenges and issues that the logging industry faces, solutions that could work across a larger area. The information provided by this study can also be used as a part of larger meta-studies that can look at updated trends from a wider, hemispherical or world perspective.

Logging-firm demographics, in particular, are concerning and are a trend seen across the industry and country. The rising age of owners (avg. 56) and employees (avg. 48) and the lack of planning for succession could leave firms vulnerable to closing, which could
lead to further consolidation within the logging sector or loss of timber production capacity if a business is discontinued. Unfortunately, attracting new employees into the profession has been problematic because of a lack of enticement [6]. In addition, Conrad et al. [10] identified timber transportation as an emerging concern in 2017, and the trucker shortage has become a major issue six years later in 2023, exacerbated by the effects of COVID-19.

These are important areas of concern that state agencies and industry groups should be working toward addressing. This study confirms what previous research into the logging industry has been revealing for many years about business demographics and employee trends, and time is running out for providing solutions to problems brought on by an approaching wave of industry retirements, ownership changes, and insurance increases.

This will be difficult in the face of an aging global population outpacing the growth of younger generations over the next few decades [60,61]. Finding new ways to encourage youth to consider the timber industry will be increasingly important. Recruitment techniques may be more effective if they are more personal and customized for potential future employees [62]. Work should be also performed to enhance the image of the forest products industry for the public; this will help encourage current loggers to promote the industry within their own family [63].

Additional research and state-wide industry surveys at regular intervals will help identify how the industry is changing, emerging challenges, and issues of concern that can be addressed by industry advocacy groups (such as the ALC) and policymakers. Additionally, these surveys can monitor and evaluate the effectiveness of any actions taken by these groups to make sure that resources are more efficiently used.

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