

An Introduction to the Southern US Wood Supply System: A Value Chain Approach*

Clayton B. Altizer¹

Abstract: Much of the economic activity generated by timber harvesting contributes heavily to local and regional economies and the subsequent currency turnover in such communities is high. Value chains are the “other side” of the supply chain, responsible for distributing elements of value back to the suppliers of those goods and services. With a supply chain, it is much easier to identify stakeholders and attach appropriate responsibilities and degrees of separation. A well-constructed value chain is much more complex and the economic and social interactions are more difficult to trace. The value chain for forestry usually extends completely across the physical and political landscape, reaching in to most geographically and economically remote locations. Traditional emphasis has been on only two segments of the value chain, timber growers and converting firms. The intermediate enterprises and participants have been considered mere producers of service, therefore largely “outside” the system. Often, businesses of this ilk are viewed as expendable and the socioeconomic contributions or benefits they offer within their respective communities are frequently discounted, ignored, or lost. This research addresses this void by proposing a model to adequately represent the complexity of the wood supply value chain.

Keywords: Timber harvesting, conceptual model

Introduction

Production forestry plays a vital role in the economic development of the southern US. Munn and Tilley (2005) state that over \$1 billion worth of forest products are harvested from Mississippi’s forest lands annually, with timber harvesting currently generating over 11,000 jobs. This influx of revenue is divided among the key players in the wood supply system (forest landowners, loggers, and consuming mills) with much of the economic benefits staying in local coffers while some of this revenue leaves local, state, and regional jurisdictions. A well constructed value chain model is beneficial for depicting these interactions and demonstrating how important production forestry is for the livelihood of rural southern communities. In many instances, a mill closure and the subsequent job loss for such communities has devastating effects. The social and economic impacts of these unfortunate events are widespread and long-term in nature. A better understanding and appreciation of the entire process is paramount for all stakeholders involved in the wood supply system.

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¹ Research Associate II, Department of Forestry, Mississippi State University, Box 9681, Mississippi State, MS, 39762, caltizer@cfr.msstate.edu, (662) 325-8027 (v), (662) 325-8027 (fax).

Current Wood Supply System

The wood supply system in the southern US is comprised of 3 primary stakeholders: the landowner, the logger, and the consuming mill. One of the social and economic dilemmas facing production forestry today is that the relationships between the key players in the wood supply system are poorly understood and not well documented. Research has traditionally focused on growth and increasing yield of individual trees or stands, or on the finished product once the raw material arrives at the manufacturing plant. The broad area consisting of harvesting timber and transporting this raw material to the consuming mills has generally been taken for granted and largely ignored. This process is critical to the field of forestry and forest products, and has a myriad of social and economic impacts for society as a whole. This is precisely the reason that the development of a wood supply value chain is imperative to the overall health of the industry.

The Wood Supply Research Institute (WSRI) and Mississippi State University researchers have acknowledged the importance of maintaining the structural integrity of the system and have responded by placing an increased emphasis on examining the timber harvesting component of the overall system. This collaboration has produced a series of reports documenting some alarming trends afflicting the current health and status of the logging profession. Most notably, the long-term logging cost index developed through this research effort has documented a 42 % increase in the overall total price per delivered ton of wood fiber using 1995 as a base year for the index (Stuart et al. 2007).

When compared to the consumer price index (CPI) and the producer price index for logging services (PPIL), both indices produced by the US Department of Labor – Bureau of Labor Statistics, an even more troubling trend is apparent. For 2005, the WSRI logging cost index is 12 % higher than the consumer price index; the largest disparity between the two figures for the entire 10-year study period (Stuart et al. 2007). The consumer price index is the price a consumer pays for a myriad of essential goods and services and is commonly used as an indicator of cost of living and/or inflation. Stuart et al. (2007) further contend that a 52 point divergence is apparent for 2005 between the WSRI logging cost index and the producer price index for logging services (the price paid for logging services). In fact, the price paid for logging services has decreased 10 % since the base year of 1995.

Supply Chains vs. Value Chains

The focus on supply chain relationships and management in the forest products industry and wood supply system has been economic in nature, and generally centered on the wood consumer. Meeting production demands and ensuring that certification guidelines are met are common supply chain models. Traditional emphasis has been on only two segments of the system: the growers and the converting firms. The intermediate enterprises and participants have been considered mere service providers, therefore largely “outside” the system. Very little emphasis has been placed on examining social and policy relationships, and responsibilities associated with conversion from the stump to the finished product.

According to Beamon (1998), “a supply chain may be defined as an integrated process wherein a number of various business entities (i.e., suppliers, manufacturers, distributors, and retailers) work together in an effort to: (1) acquire raw materials, (2) convert these raw materials into specified final products, and (3) deliver these final products to retailers”. This chain is typically depicted as a forward flow of materials and a backward flow of finances and information. This backward flow is the framework for a value chain. Value chains are the “other side” of the supply chain, responsible for distributing elements of value back to the suppliers of those goods and services.

Supply chains are used more frequently than value chains even though the terms are often used interchangeably. Neither is commonly used in describing the wood supply system. They are more common in the field of agricultural economics, specifically in relation to topics directly involved in the food chain. Salin (2000) examines the cattle-beef market and focuses on the importance of responsiveness to consumer needs and efficient delivery of goods to consumers. Ward and Stevens (2000) state that for many agricultural products, mainly beef and dairy products, the identity of the initial product remains virtually clear along the distribution chain. For other products, including those manufactured from wood fiber, the identity of the initial product can be “lost” as it is transformed into the finished product.

The development of an integrated supply chain requires the management of material and information flows at three levels: strategic, tactical, and operational (Mason-Jones and Towill 1999). These approaches are commonly found in business system engineering designs and information systems. Consumers are becoming more diverse in their demands which have created increased pressures on service industries to provide high quality diversified products at a low cost (Talluri et al. 1999). Modern society has added a fourth dimension, that of protecting the environment.

Davis (1993) stresses three distinct sources of uncertainty that plague supply chains: suppliers, manufacturing, and customers. Late deliveries from suppliers, machine breakdowns in the manufacturing process, and changing consumer preferences are a few, among many, scenarios that can disrupt the smooth flow of an ideal supply chain. The forestry supply chain is complex beginning with the grower (landowner), the producer (logger), and the supplier (dealer or broker).

Chains differ from traditional marketing channels in the degree of cooperation among firms involved in the process (Salin 2000). With a supply chain, it is much easier to identify stakeholders and attach appropriate responsibilities and degrees of separation. A well-constructed value chain is much more complex, and the economic and social interactions are more difficult to trace. For the purposes of simplification, supply chains illustrate the relationships necessary in converting a raw material into a finished merchantable product. On the other hand, value chains depict the entire process in a more 3-dimensional model which encompasses everyone that either contributes or benefits from the process being analyzed.

Conceptual Model

This research presents a conceptual model depicting the wood supply value chain. All players in the system will be documented and their sphere of influence will be traced throughout the wood supply process. This model should serve as a foundation for a more complex depiction of the wood supply value chain. It should be noted that in reality the stakeholders comprising the model function and interact in a 3-dimensional format. However, to better describe the model and facilitate comprehension, it is unraveled and presented in a 2-dimensional format.

Landowners and transportation firms have a vested interest in the process, as do loggers and the consuming mill. It is important that these entities, while sometimes of lower profile, are included in the stakeholder process. Failure to include them results in an incomplete value chain and leads to flawed decision-making. The model constructed quickly evolved into a considerable network and defining it in detail will require additional work. The structure is most easily illustrated by dividing the model into several different sections for discussion, and by following one sample branch of the network. Other branches of the network should be expanded and explored in the same manner. The reader should understand that the model accounts for both direct and indirect relationships at several levels and these relationships extend in both directions.

Primary relationships with any entity in the supply chain are those with a direct business relationship, such as between the mill and a chemical or energy supplier or between the logger and a wood dealer. A secondary relationship for the mill is that between a primary supplier or customer and his customer or supplier. A mill, relying on a dealer system for procurement, has a primary relationship with the procurement division of the plant, a secondary relationship with the wood dealer, and a tertiary relationship with the logging contractor supplying wood through that dealer and with the landowner from whom the dealer acquires timber. A fourth level or quaternary relationship is one step further removed. The mill would have a quaternary relationship with the labor force working for the logging contractor, the fuel supplier to that operation, and the equipment dealerships supplying logging machinery. The grocery store where that worker's family buys food and the bank that holds their mortgage has a fifth level or quinary relationship with the mill.

“Arms length relationship” is a term used to explain legal relationships between separate entities and is commonly used in the wood supply industry (Black 1990). Primary, secondary, tertiary, quaternary, and quinary simply describe how many “arm lengths” separate the entities. These arm lengths form the value chain, and the action of any one of these entities has an effect on the others. That effect may be diminished or amplified by the distance between the two parties. Some actions are diffused as they move down the supply chain while others are amplified. All direct suppliers and customers are stakeholders in the supply chain for they have made an investment of money, skill, energy, and time in the functioning of the process. Process changes and variability have an effect on the viability of those investments.

The model can be best understood by selecting a starting point and tracing the multiple direct and indirect relationships through the entire system. The mill was chosen to be the center of the model for this discussion (Figure 1). The choice of the mill as the center is not intended to reflect a placement of importance, but is simply an arbitrary, but important, starting point. Solid

connector lines between boxes indicate direct or “primary” relationships. The direct suppliers are shown at the top of the chart; the direct customers are to the right. These are the stakeholders who have invested in the mill’s supply chain in expectation of some form of economic return. Indirect suppliers and customers are located below the mill in the diagram and are joined by dashed lines. They were not separated as suppliers and customers because in many instances such as the political structure of the community surrounding the mill, they serve both roles. These suppliers and customers seldom have a direct investment in the mill or supply chain, but may have a financial or emotional investment in things affected by the actions of the supply chain. Suppliers have been grouped into broad categories by goods or services offered, and even this list was truncated for simplification. The order of listing does not imply importance or the amount of money spent.

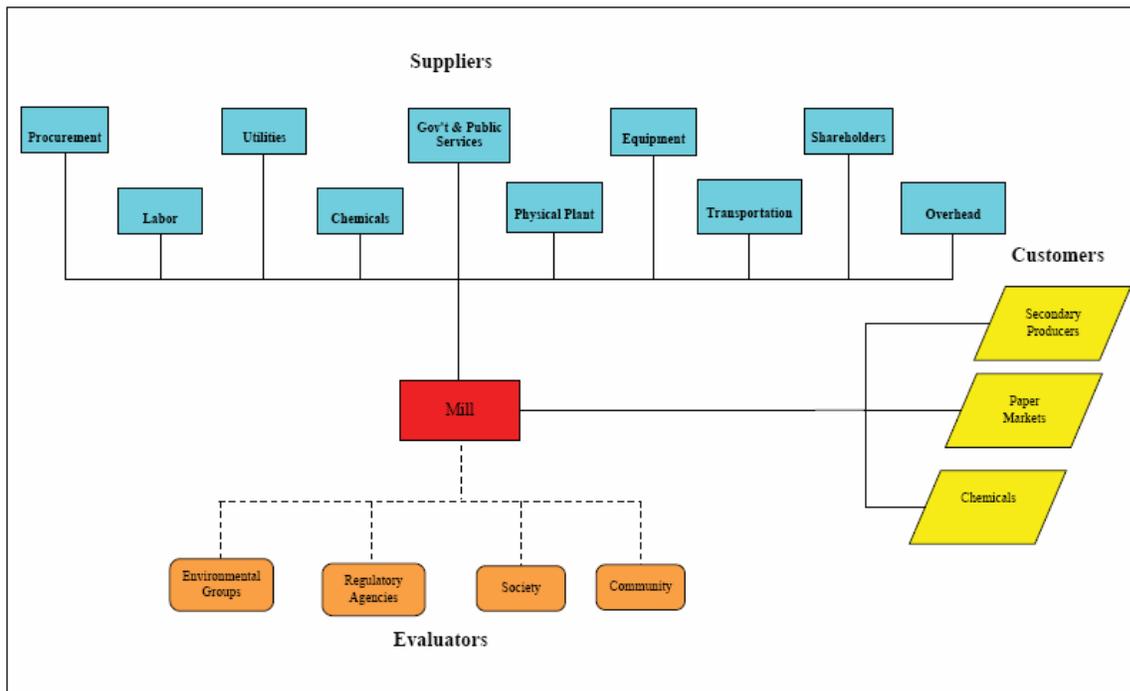


Figure 1. Value chain relationships using the mill as center of the model.

Figure 2 illustrates the value chain model for the wood procurement division of the mill in the previous figure. The boxes at the top are again direct suppliers, those at the right are direct customers, and those at the bottom are indirect customers and suppliers. The solid line between the procurement box and the mill box denotes a primary relationship between fiber procurement and the mill. In like fashion, those boxes connected to the procurement box by solid line enjoy a primary relationship among each other and with mill procurement. For example, wood dealers under contract with fiber procurement may be serving the same role for a sawmill, which in turn is a direct supplier of residue chips to the procurement organization of the mill. Those relationships that are primary to procurement are secondary to the mill, as they must flow through procurement before reaching the mill.

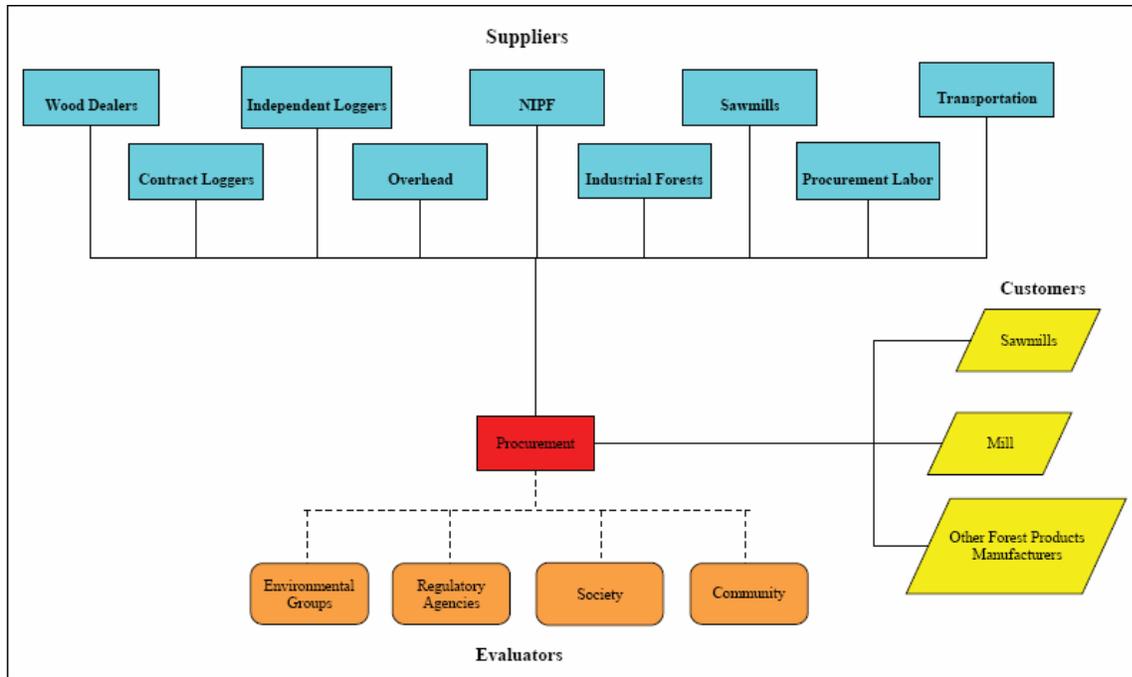


Figure 2. Value chain model for wood procurement division of the mill.

The indirect customers and suppliers for fiber procurement fall into the same broad category as for the mill, but are likely quite different groups or segments of larger groups with different or specific interests. Where environmental groups with concerns over air quality and point source water pollution are attracted to the mill, those associated with procurement are more likely to have concerns about endangered species, clearcutting, and non-point source pollution. Figure 3 delves one level deeper in the value chain and shows functional relationships for wood dealers, an example of secondary stakeholders of the mill. The position of the boxes relative to the central wood dealer box is the same as in the previous examples. Independent and contract loggers supplying wood through this dealership have a primary relationship with it, a secondary relationship with procurement, and a tertiary relationship with the mill.

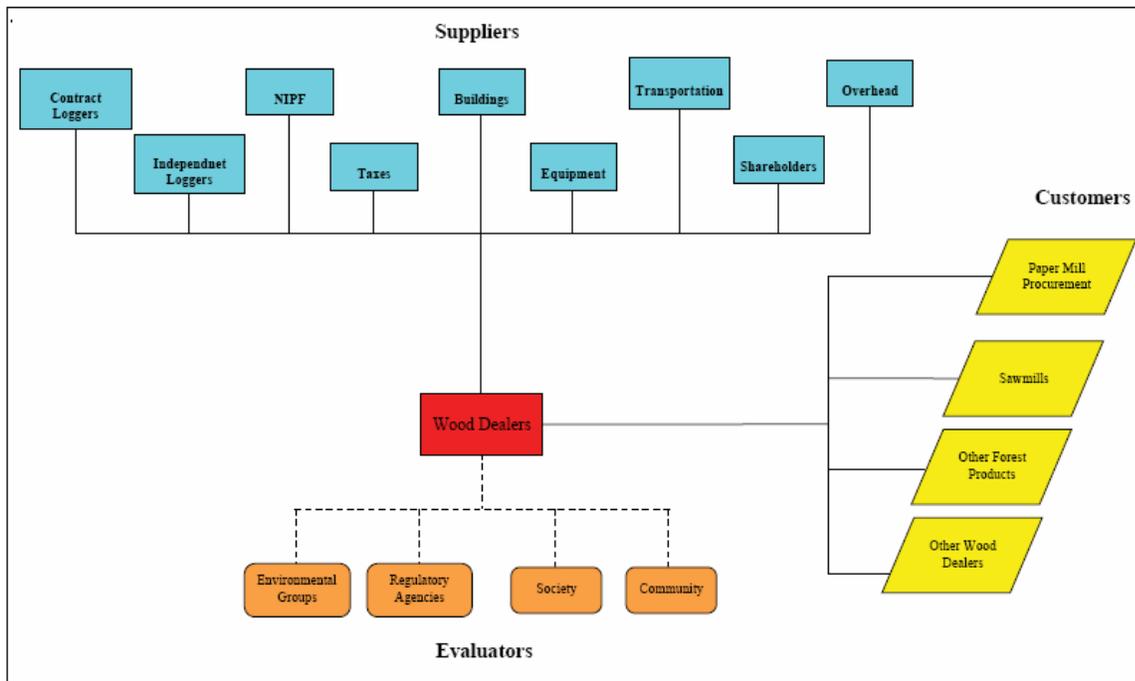


Figure 3. Value chain model for wood dealers responsible for supplying harvesting force for the mill.

Indirect customers and suppliers again fall into the same broad categories, but operate on a different scale. As the scope of operation becomes more localized, these do as well. At this level, local chapters of larger environmental groups are important, as are relationships with regional planning groups, county government, local newspapers, and civic groups. The cost of meeting the concerns of these groups is more easily identified. Expenditure which is required to meet the concerns of these groups is a part of normal business practice and support the firm's position in the local business community and forestry community. The potentially larger costs and less predictable costs are those of lost business opportunities and possible legal proceedings if something goes wrong.

Figure 4 moves one more link down the chain to the logging contractor, who has a tertiary relationship with the mill. The nature of both direct and indirect customers and suppliers change again. Many of the direct relationships at this level are community based and scattered throughout the procurement region. Labor drawn from the local pool, fuel purchased from a local supplier, and equipment purchased from a local dealer. The nature of the indirect customers and suppliers is also more localized. Public relations may focus on the adjacent landowner, government relations on the county road engineer, and environmental concerns on a specific stream segment or wildlife species. Again, the costs become more concrete. Business opportunities are tied closely with local business reputation. Additional costs are quite often in the form of fines for regulatory violations, performance bonds, permits, and insurance costs.

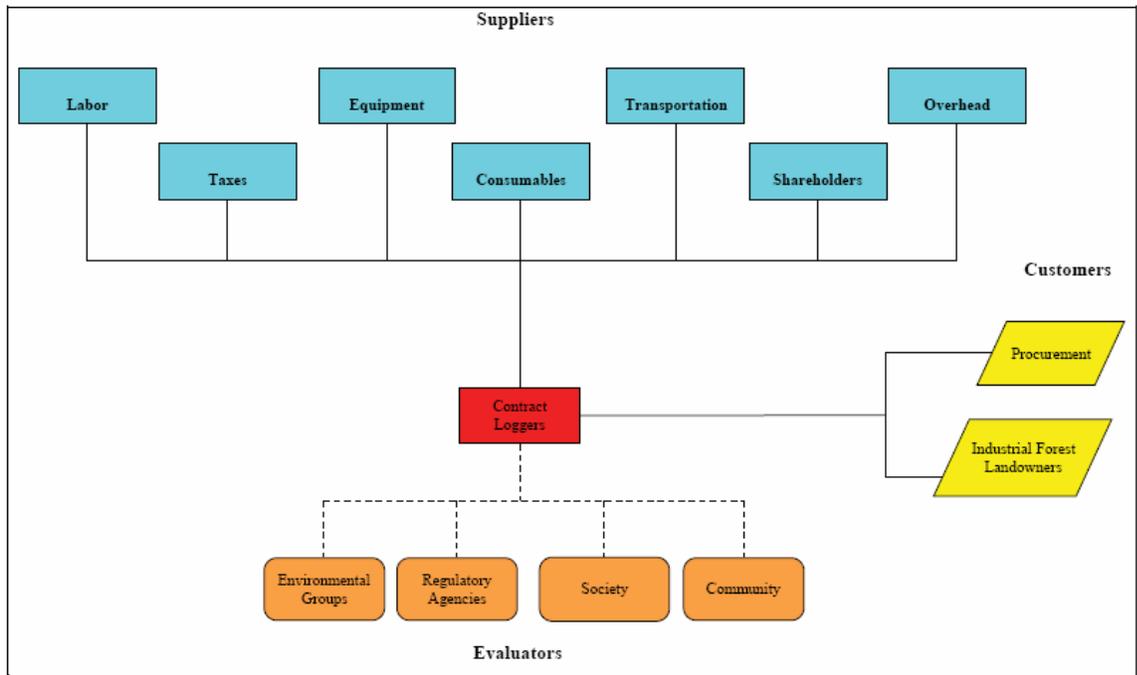


Figure 4. Value chain model for contract loggers working through a wood dealership system.

Labor, working for the logging contractor, has a quaternary relationship with the mill, and also has a very personal interest in the paycheck that originates there. The direct suppliers to the labor working for the logging contractor (Figure 5) are largely commercial or mercantile and represent a quinary relationship with the mill. The nature of the indirect suppliers and customers also become very localized. The indirect suppliers at this level can make their presence felt through the political process, through the financial system, or simply by refusing to extend services.

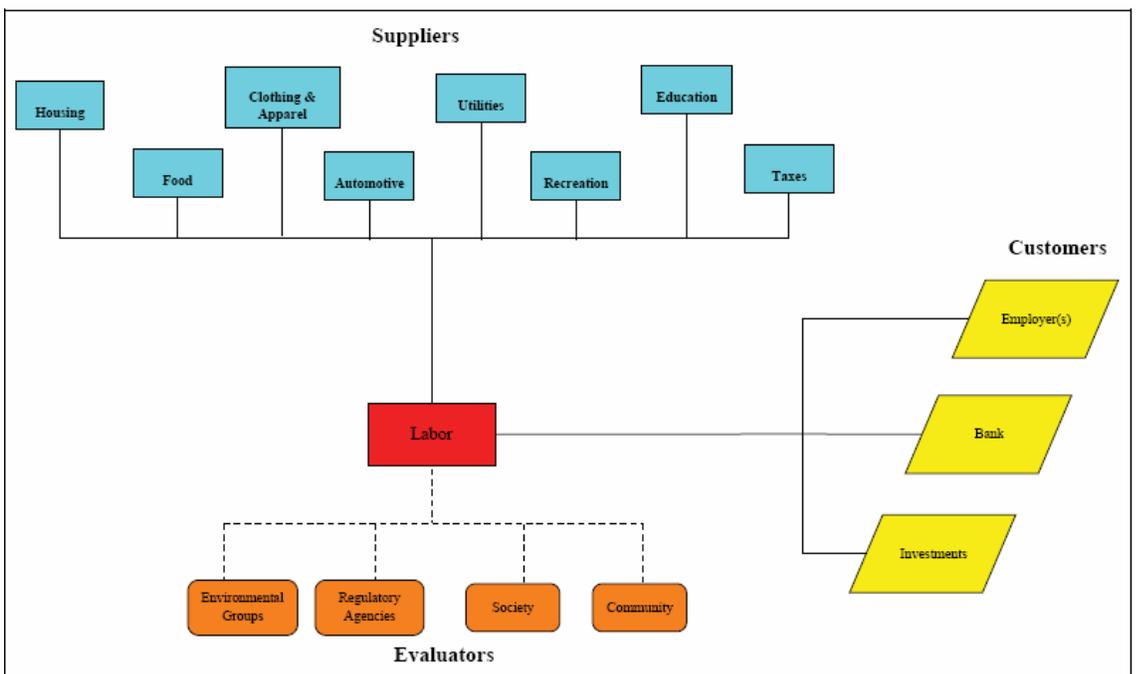


Figure 5. Value chain model for the labor component of independent logging contractors.

Conclusions

Today's harvesting sector is plagued by drastically increasing operating costs, cash flow problems, and a general uncertainty of future production capacities. The economy of scale principle, which is commonly observed in manufacturing, does not seem to apply to timber harvesting firms. Corporate mergers and acquisitions, as well as constantly changing mill and wood procurement management, have created a cloud of uncertainty regarding the future role of independent contractors in the wood supply system. In this sense, the struggle of farmers trying to provide our country with a steady food supply and independent loggers trying to produce enough raw material to meet our nation's demand for wood fiber are essentially the same. Likewise many of the problems facing agriculture and production forestry are identical, and both sets of problems have the potential to adversely affect the future roles of each profession.

Effective management of the value chain is critical to supply chain management, for if the suppliers of goods and services are not satisfied that they are being properly remunerated, they will withdraw their services. Increasing operating expenses coupled with decreasing prices paid for services rendered affects the entire wood supply system and the ramifications and repercussions can be severe and long-term in nature. The value chains for many industries are relatively short, extending through the town or city where the plant is located. The value chain for forestry usually extends completely across the physical and political landscape, reaching in to the most geographically and economically remote locations. Such complexity warrants further exploration and expansion of this model to accurately depict the wood supply system in detail and the subsequent socioeconomic effects on local and regional communities.

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