



Management Decisions in the Forest Products Industry: *Where Good Companies Go Astray*

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In the past two decades alone the forest products industry has suffered in the face of what many observers would consider a series of self-imposed disasters. Many of these have been at the individual company level, while others have affected whole industry segments. Perhaps the best known example at the industry level would be the loss of U.S. household furniture manufacturing capacity to overseas competitors (cf. Bumgardner et al. 2004). At the individual company level, the impacts have ranged from the closure of many smaller sawmills to Federal antitrust suits against the large, integrated forest products corporations.

It is our contention that decisions made, or not made, by senior managers within the forest products industry have arguably caused much of the misfortune that has beset our producers. Leadership at the executive level is critical for the success of any organization (Hambrick and Mason 1984, Finkelstein and Hambrick 1996), and strong leaders are especially needed when a firm or industry faces increasing competition or uncertain economic times. Such a situation has characterized the U.S. wood products industry for a number of years (Buehlmann et al. 2003), and yet evidence indicates that many of our executives are not making decisions that will effectively lead their organizations.

Strategic leadership for most wood product firms begins with the owner, president, or chief executive officer. Many of these leaders have successfully guided their companies through the multitude of competitive contingencies the market has brought to bear, thereby resulting in solid performance, growth, and profitability despite the many challenges (e.g., Seeger and Ulmer, 2002). However, it should also be clear that many firms have not been led to the same lev-

els of success. This dichotomy leads us to consider the ways in which management decision-making has impacted the success of our industry and of individual organizations.

This article discusses examples of industry actions that have led to undesirable outcomes, and how management decision-making directly or indirectly caused them. We will use results from data we have collected from managers over the years, plus anecdotal or case study evidence from our own experiences working with companies in various segments of the wood industry. Unless citations are provided, the opinions expressed are our own, drawn from conversations, interviews, or other contacts with managers of those companies.

Our primary goal with this article is to illustrate examples of how decision-making can cause negative consequences and encourage industry leaders to reconsider how decision-making impacts their businesses. In addition, it may prove valuable for academics to understand that no matter how outstanding the ideas we provide industry, there may be cognitive reasons why some managers will not put them to use. As the broad forest products industry faces a multitude of challenges to its continued survival, there has perhaps never been a more critical time for industry leaders to work on making better decisions. As we will see, this can have implications for everything from decisions to build new plants to buying new equipment to which markets are entered.

Management functions

Business school students taking a Management 101 class are taught that the core managerial functions include

planning, organizing, leading, and controlling (Hellriegel, Jackson and Slocum 1999). And at the heart of these roles is making decisions (Simon 1987). The importance of decision-making is even clearer when we hear many experts say that above all else, managers are made or broken by the quality of their decisions.

Lots of low- and mid-level employees in our industries make decisions on a daily basis. People like lumber graders, headrig operators, and drivers make hundreds or even thousands of basic decisions a day, all of which can have impacts on profitability. For example, one study found that approximately 75 percent of decisions made by graders in a rough mill setting were erroneous in at least one way (Buehlmann and Thomas 2002). Such decisions impact a mill's bottom line via a substantial reduction in yields.

However, it is the decisions made by managers that can directly impact the success and competitiveness of a wood producer. In fact, past research suggests that decisions made by a firm's top management team can account for nearly half of a company's performance (Finkelstein and Hambrick 1996). But are the key decisions made by industry leaders always clear-cut and simple? And do they always result in enhanced productivity and profitability? Of course not, and this is because many of a company's most important decisions are fraught with uncertainty and subject to influence, emotion, and bias. It is the effects of bias that can cause managers to make some of their biggest mistakes, so it is therefore important to understand how bias can impact decisions made by managers in the wood products industry.

While decision-making is arguably the most important aspect of being a senior manager (Garvin and Roberto 2001), this is an area in which few managers receive formal training. Obviously, lots of wood industry employees are trained to make technical or quantitative decisions, but not many managers are taught about ways to optimize individual and group decision-making. One of our challenges is therefore to help managers in the wood products industry make better decisions in light of the inherent biases and ambiguity that interact with designs of their organizational systems.

Why management decisions matter

The so-called upper echelons theory in management science was developed by Hambrick and Mason (1984) based on the assumption that executives do matter to their companies. The upper echelons perspective is grounded in strategic choice — emphasizing that a manager's strategic decision-making influences company performance. Studies have found that executives can impact from 5 to 44 percent of the variance in firm performance (Finkelstein and Hambrick 1996, Weiner and Mahoney 1981). Further, a significant number of organizational theorists have historically argued that top executives are responsible for making the decisions that have considerable influence on organizational performance and economic sustainability (Barnard 1968, Child 1972, Cyert and March 1963, March and Simon 1958). In addition, the leadership literature is replete with findings of how leaders significantly impact the outcomes of organizations both good and bad (e.g., House, Spangler, and Woycke 1991).

This implies that a firm's management team had better

be very good at making decisions, or at the very least can't afford to make a lot of bad decisions. But unfortunately we see case after case of management decisions that have cost wood manufacturers untold dollars. We next discuss just a few of these cases, all of which were caused in whole or part by poor judgment and decision-making.

Where good companies have gone astray: examples of negative outcomes

No fewer than eight major wood products companies have produced hardboard or OSB siding that eventually subjected them to class-action lawsuits. The individual suits that were litigated, in some cases for more than a decade, cost the shareholders hundreds of millions of dollars in settlements, several hundred millions more in legal costs, and damaged customer perception of the companies involved.

One of these eight, Louisiana-Pacific (LP), had more than its share of problems in the 1990s. Two of its managers were indicted for tampering with emissions monitors, increasing production at night (to hide the smoke) and violating the Clean Air Act at its Olanthe, Colorado, OSB plant (Siegal 1998). They also were accused of deceiving inspectors about quality issues and substituting non-standard production as mill-run production for the sake of demonstrating minimum strength properties. The plant manager spent nine months in jail for his role in the violations, and the company was fined \$37 million. Ultimately, the CEO and his two top lieutenants were ousted by the board of directors (St. Clair and Cockburn 1995) as class-action claims against LP panel quality mounted¹.

As OSB markets were taking off in the early 1990s, LP held an apparently dominating market position in that product. Corporate leaders of several competing forest products companies chose not to get into the OSB business at that time in spite of advice from their mid-level technical and sales personnel, as well as predictions from government and academics (e.g., Montrey and Utterback 1990). Later reversals of course caused those companies to be very late to the party; they eventually made half-hearted investments in sub-optimal competitive or alternative operations that did not take advantage of the declining costs of OSB production (Spelter 1996). They never caught up to LP in OSB production and suffered financially from a too-heavy reliance on low-margin softwood plywood products when business in the higher-margin OSB business was booming (Skog et al. 1995, cf. Spelter 1996 for a chronological listing of panel mills by ownership).

Broad-based evidence of negative outcomes from poor decision-making can also be seen in the number of wood-based companies that go out of business each year. Some research suggests, for example, that at least 10 percent of softwood lumber companies go out of business each year (Spelter 2002), with even higher figures for primary producers in the hardwood industry. While it might be easy to blame economic conditions, global competition, or government regulations for our business failures, experts believe

¹ For an overview of lawsuits against LP see Chapter 13 in Hensler et al. (2000) or *U.S. v. Louisiana-Pacific Corporation, D. Colo.*

that the more likely cause is simply flawed decision-making by managers (Lovallo and Kahneman, 2003).

Where management decision-making goes wrong

If many of our business failures are caused by faulty decision-making, then it would seem important to have a better understanding of how and why managerial decision-making can go wrong. The following section discusses some of the main areas that we believe have the most impact in the wood products industry. As we illustrate, the effects of bias, coupled with entrenched organizational systems, are often the key factor causing managers to make poor decisions.

Bias in judgment: Overconfidence

Perhaps the most prevalent bias we see has been termed “management optimism and overconfidence.” This is a dangerous bias that can occur when managers become so overconfident that the possibility of failure gets discounted and they end up making poor strategic decisions. An example that many readers may remember is when Daimler-Benz decided to buy Chrysler. The CEO and members of his upper management team had become so successful at running their own company that they assumed they could manage the merged DaimlerChrysler with the same success. Even though many of Daimler-Benz’s analysts and consultants warned that it was a mistake to purchase Chrysler, the CEO went ahead with the deal (Garvin and Roberto 2001). Today the Daimler-Chrysler marriage is widely seen as a strategic disaster that cost the firm’s stockholders dearly (Nguyen and Kleiner 2003, Waller 2001).

Similar examples of overconfidence are seen in our industry during periods of economic downturn such as the one we are currently encountering. Leaders can

become so overconfident during the good times that they discount the signs pointing toward a change in conditions. A prime example is that of Toll Brothers, one of the nation’s largest high-end homebuilders. Chief Executive Officer Bob Toll has been noted for his ability to “read” the market (Rice 2008), but his failure to accurately foresee the housing crisis starting in 2007 has cost his company well over a billion dollars.

One of the exercises we’ve done with several hundred managers from various parts of the wood industry reveals evidence of this important bias. The exercise requires participants to rate their abilities relative to the other managers in the room; examples would include abilities related to bargaining, driving, and even honesty. Participants are told to rate themselves at 100 percent if they are the best in the room and zero if everyone else is better than they. Even though the average should come out to 50 percent, we regularly see averages well into the 80 percent range (see **Table 1**).

These results may seem innocuous enough, and yet they reflect a common bias that can have potentially serious consequences for a firm. The bias is related to overconfidence in one’s abilities relative to others, and often leads managers (especially younger males) to assume they will be able to avoid or easily overcome potential problems when executing a project. If you’ve ever heard nightmare stories about a green-field mill coming in 50 percent over budget, or a sales forecast for a new territory that was 30 percent too high, then you’ve seen what can happen with unwarranted overconfidence.

A related exercise is one in which participants are asked to provide their best guesses for six different quantities. Not only do they give their best guess of the actual amount, but they also are allowed to give a range within which the actual amount will fall. The trick is that the managers are told to fill in the range so that they have 98 percent confidence that it will contain the actual figure. **Figure 1** shows how this works, including six unknown quantities that have been used in the past.

In a typical class of managers, at least 90 percent of them will get the first amount correct (i.e., provide a range that contains the actual age of Coach Joe Paterno). But, the amounts in question have purposely been designed so that each one gets a bit harder than the previous quantity. The trend we always see is that the percentage of people whose range contains the actual amount gets steadily smaller from the first to the last amount. Thus, managers continue to provide narrow ranges even though the exercise allows them the opportunity to input very large intervals. The trend is important because it illustrates how managers’ estimates can be most incorrect when tasked with guessing an amount that is far outside their realm of knowledge. While managers are generally accurate with familiar quantities, the danger lies in the manager who is asked to provide an answer to a question with which he or she is very unfamiliar.

It is noteworthy that we did not make up these two examples of overconfidence in managers. Variations on these exercises, and others like them, have been used by industrial psychologists for decades to illustrate to managers that they too are subject to biases stemming from

Table 1. — Illustration of managers’ overconfidence in relative competencies.

	Rating of your Relative Ability (0–100) (averages)
Your bargaining abilities	60.5
Your decision making abilities	69.8
Your intelligence	65.9
Your honesty	84.4
Your physical attractiveness	60.6
How much money you will make in your lifetime	58.3
Your driving ability	73.8
Your mental stability	74.9
Your future skill as a manager 5 years from now	71.4
Your problem solving abilities	70.4

* averages from more than 250 wood industry managers

overconfidence (see Bazerman (1998) for an excellent review). We provide these examples to illustrate from a “laboratory” type setting what actually happens in real life. Overconfidence and unwarranted optimism are such significant issues that we will see their effects intertwined throughout much of the following discussion.

Chasing unprofitable customers

Unfortunately, our industry is often characterized by a bias toward chasing, and then keeping, bad customers even though the company would be better off if they were “fired.” A prime example of this is when LP signed an exclusive supply contract for softwood studs with a national home center chain in the late 90s. At the time it was hailed as a major marketing triumph for LP. Just thirty months later, however, that contract had become a huge anchor pulling the business slowly, but surely, under and eventually encouraging LP to divest itself of its solid lumber business (cf. SEC 2002).

This is a good example of what is known as “the winner’s curse” (Bazerman 2004) and is another issue that often causes negative consequences for our producers. Even though the lumber producer “won” the contract, they soon found out that it was not to be such a great deal after all. This was because the customer had come to know so much about the supplier’s mills and costs that every last cent of profit had been squeezed from the lumber mills, and business transaction costs had made that customer an over-weighted loss leader for the producer. In the meantime, the leverage gained by the distributor played a significant role in suppressing lumber prices in that particular product category well beyond the term of the agreement with the over-zealous lumber company.

Industry’s zeal for pursuing customers can also lead to negative consequences when leaders focus more on sales volume instead of margins and profitability. For example, in wood commodities markets the push from corporate headquarters will often be to increase market share. But when managers are rewarded based on increases in market share, they will often enter into sales arrangements “with cognitive blinders on” and do not consider the profitability of the new customers needed to gain market share. This is perhaps one of the reasons that increases in market share do not necessarily lead to increased profitability (Szymanski et al. 1993). These blinders can lead sales management to overlook important contractual details that unknowingly put them in a position of weakness vis-à-vis their partners. They then provide company leadership with an overly rosy view of the distribution partnership and hence an unwarranted confidence that the contract (and the increase in market share) will provide the predicted profits.

An additional problem develops since this bias often compromises the control of information that the customers and/or suppliers can then use against both their new “partner” (i.e., the lumber producer) as well as other companies in the industry. Signing loss-leader contracts, granting volume discounts, and sharing proprietary company data (e.g., cost data), may open the door to big accounts (and big bonuses for individual managers), but it usually leads to powerful leverage for the customers and

suppliers against the manufacturer in future years. We believe this has become a fairly common development in the wood industry, where one agreement between large corporations can negatively influence the market and competition for years.

Escalation of commitment

Another costly but common bias is called escalation of commitment, and occurs when a company’s management continues to commit resources to a failing cause even when there is a slim hope that the situation will dramatically improve. Decision-makers close to a given problem often become so biased that they continue a commitment to a previous decision even though a rational decision-maker would just pull the plug. We’ve worked with a variety of primary and secondary wood producers who have fallen into this trap, with the situations ranging from acquiring another company to developing new products.

A typical example occurred during a recent project with an owner of a growing unfinished furniture manufacturing company in Pennsylvania. The owner had grown his business over a decade to the point that he had gone from five to more than 150 production employees. He had recently expanded his production facility to the limits of his acreage in an industrial park, and decided to buy another plot of land next to his plant. He was so certain of an increase in sales that he paid for a concrete pad to be built on his new lot. About this time, however, the U.S. economy started to slow and demand for unfinished furniture quickly leveled off. This presented the owner with a key decision: one option was to go forward with plans to

Figure 1. — Sample confidence level assessment tool.

Confidence Level Problem:

Listed below are 6 items with uncertain quantities.

1. Starting with #1, write down your best estimate of the true amount.
2. Then write in a lower and upper bound around your estimate, such that you are 98% confident that your range surrounds the actual amount.

Your estimate of <u>actual number</u>	Range		
	Lower bound	Upper bound	
			1. Joe Paterno’s age
			2. Total U.S. population (2000)
			3. Number of new wood pallets produced each year in US
			4. Number of (single family) housing starts in 2006 (U.S.)
			5. Wal-Mart 2007 sales (\$)
			6. How many acres of timberland are there in the U.S. ?



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erect the new building on the pad that he had just paid for. Or, he could instead put his expansion plans on indefinite hold. As with many managers, the owner approached this decision by strongly considering the several hundred thousand dollars he had invested in land and concrete. His thought process, as he described it, went something like this: "I have just invested considerable funds, and I cannot afford to waste that money by not going forward with building plans. Therefore, I will spend an extra quarter-million dollars for the new building and hope that economic conditions turn around."

Several advisors to the owner saw that his commitment to the project had the potential to hurt the company financially, but the owner's decision-making was biased by a combination of his escalated commitment and what is commonly

known as a "sunk cost bias." Unfortunately, this combination is very prevalent in many parts of the wood industry and has cost companies in many ways. Perhaps the root cause with our managers is that they do not effectively discount (i.e., ignore) funds already spent when deciding whether additional funds should be allocated to a project.

We saw another example of this recently at Pennsylvania House Furniture, a major brand-name integrated furniture company and subsidiary of La-Z-Boy, Inc. The company's flagship operation in Pennsylvania was a century old, and although they prided themselves on their attention to the brand and recent efforts to upgrade the production facility, it had become a nightmare of conflicting engineering design and management philosophies. Our early analyses of the company revealed a critical need to down-size and sub-contract some of its operation, primarily the lumber procurement and drying portion of the mill. Yet, the leadership maintained that lumber drying was a core competency, and that their accounting system proved that by drying their own lumber they were minimizing their raw material cost to the dimension mill and furniture assembly plants.

A bias came into play because they refused to consider how much of the company's capital the drying operation was tying up as they continuously carried millions of board feet of dry and green lumber inventory. Moreover, a few managers could not get past the idea that they had just invested heavily in three new dry kilns and gone to great lengths to justify their installation. Leadership also failed to consider how the "allocation" of their raw material and drying costs over their production, as determined in their accounting system, was biased toward in-house production and against out-sourcing, even though outsourcing promised great opportunities to "lean" their operation and create a company much more responsive to the marketplace. Ultimately, their slow market response and inefficient system caused La-Z-Boy management to close the Pennsylvania House facility in Pennsylvania and move all the production of the famous old brand name to China. In more academic terms, managers at various levels of this company allocated resources in a manner that justified their previous commitments, regardless of whether or not those initial commitments remained valid (Bazerman 1998).

Organizational silos: Failure to share information and data in decision-making

Failure to share key information within an organization can be seen as the cause of many unfortunate decisions, the results of which range from costly to catastrophic. One case with disastrous consequences was detailed by the 9/11 Commission (Kean and Hamilton, 2004). In hindsight, it became quite clear that the U.S. government had more than sufficient information that could have not only stopped, but also forecast the terrorist attacks. The problem, of course, was sharing the available information between such agencies as the CIA, FBI, FAA, etc. (e.g., see Bazerman and Chugh 2006).

Organizations in the wood products industry have also endured the consequences of not effectively sharing information internally. As noted above, leadership at a major OSB producer rushed to market with a defective

panel product that had not been thoroughly tested and cost the company millions in damages. The disaster resulted in part because the organizational system was designed in such a way that “silos” of knowledge existed internally so that critical technical information did not always flow upward to the decision-makers. Silos in organizations exist when one function or department does not effectively share information and/or data with others in the company. Past research suggests that these silos can drastically impact the sharing of information within an organization (e.g., Barua et al. 2007).

The shining hope for organizational advancement touted in the 1990s was that the computer-enabled “information age” would open up the carefully controlled channels of communication so all employees could utilize the entire base of information to their fullest capability. In some respects, this has happened; Internet access has given individuals the ability to strengthen and expand their technical knowledge bases from resources outside the organization. And within organizations, internal communications departments have created organizational news forums and access to some databases to which most individuals did not have prior access. So, on average, companies have more fully informed and developed employees.

But the actual fulfillment of organizational advancement has not occurred; the promised improvement of data quality in organizational decision-making has not been realized. In reality, the additional information that has been made available is the equivalent of assigning more capacity to non-constraining resources in the organizational optimization model. The true constraining resources, the power positions in the organization, still carefully control access to *mission-critical* information. And the managers who control this mission-critical information tend to be much more internally focused than employees farther out on the periphery of the organization. The result is that the information that is actually processed in most high-level decision-making processes suffers from both this internal focus bias as well as a bias resulting from filtering out the negative aspects of any project that these key managers tend to be favoring.

These biases often play out as critical management decisions are in their last stages of sign-off, as we see in this example. Sales personnel for a major paper company that had nearly two years invested in the decision to build a new paper machine became aware that prices in the targeted product line were softening and that major foreign competitors were moving forward with more capacity in the same product overseas, where production costs were likely to be lower. However, internal constraints and filters on this information, even though it was widely known in the industry, suppressed the consideration of these new developments and allowed the project to go forward. At the same time, engineers on the project had received revised cost estimates that increased the expected cost by nearly \$200 million. This information also was suppressed as top management presented the “final” proposal to the board of directors, in the belief that these cost increases might be compensated for by trimming other aspects of the project.

This unfortunate, but common, situation in the wood industry mirrors what experts have called “delusional

optimism” (Lovallo and Kahneman 2003). Managers are too often guilty of accentuating the positive aspects, to themselves and to superiors, of a project or contract while ignoring data that might disconfirm their hypotheses. This actual case study ended with predictable results. The project costs were trimmed, though not by the amount necessary to offset the cost increases; the resulting technical compromises reduced the effectiveness of the engineering solution, led to more design compromises, and increased maintenance costs for the machine at start-up. Actual start-up of the machine ran nearly a year longer than expected because of these engineering issues and vendor re-negotiations. Meanwhile, the market for the product was indeed impacted by the new overseas capacity; by the time the company reached the market with the new paper line, prices were far below anything that would sustain a reasonable pay-back for the company. The project walked in red ink for years, and the plant manager of the mill was shown the door by the board of directors soon after the start-up of the machine.

This case illustrates many of the classical managerial biases mentioned in this paper. Company management was buoyed by recent high profits and had grown overconfident in its ability and intuition. As the idea gathered momentum and the project designs were finalized, management became over-committed to the one particular path forward and followed it to its disastrous end. The engineers were biased due to high internal pressures toward the selection of vendor technology that, while higher in cost, was preferred by upper management as “state-of-the-art” technology and therefore had better chance of sign-off by the management team. In their rush to finish their project, management’s attention had been temporarily diverted from focusing on the impact of increasing competition; in doing so, they had both actively and passively created a barrier to information that resulted in a biased selection of available information.

Bias in project selection

Very often, managers fall prey to a selection bias when considering alternatives for a project. These biases form very early in an individual’s professional development and take many forms. They are manifested as a bias to opt for “cutting-edge” technology that leads (unexpectedly) to “bleeding-edge” implementations; or the opposite, a bias toward “tried-and-true” technology that may have been passed by recent technological developments, resulting in the implementation of a “new” operation that is “old” and uncompetitive from its start-up.

Selection bias can also manifest itself in strategic contexts; most common in large corporations is the bias for building green-field operations (which add more capacity to the market) rather than investing in buying out competing operations (which do not). The opposite of this is another common bias, one for buying old, dilapidated operations that management optimistically assumes can be made more profitable under their better management, instead of identifying a better market opportunity and building a new facility designed specifically for that opportunity. These strategic selection biases often occur differentially in large corporations, with one business unit’s



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high-profile manager opting for high-tech green-field investments against all caution and another business unit's head opting for constricting caution in investment to the point of missing key opportunities and saddling the company with bloated, inefficient operations that their competitors were happy to unload. Therefore, it is not uncommon to see the same corporation with one or more over-extended business units saddled with one or more under-performing business units. In fact, this situation is common precisely because the managers' biases are compounded by their dislike for their internal competitors and their resolve in proving the others' tactics wrong.

Selection bias can almost always be countered by due diligence in project analysis. Weaknesses in assumptions can be tested and highlighted by operations research (OR) techniques, such as simulation modeling and linear programming to alternative sets of assumptions under different levels of certainty. However, these skill sets are not commonly employed in the wood products industries; even when they are, the results presented by the analysts are often discounted by the overconfidence of upper management in its own intuition, as mentioned earlier in the paper.

Still doing things the same old way

One last example illustrates the mountains that we sometimes must climb when attempting to assist some leaders in our industry. A few years ago at a hardwood lumber trade association meeting a speaker was promoting exporting to Europe, but met resistance from a few of the old-timers in the audience. One of the responses explaining why the lumbermen weren't interested in exporting went something like this, "I remember World War II, and I will never do business with the Germans." Obviously, this is a

rare example of how we are often stuck following the status quo, but it does illustrate the mindset of some industry leaders that have a hard time moving forward.

How managers can improve their decision-making

While decision-making is the most important task for managers and executives, it is also known as being the "toughest and riskiest" (Hammond et al. 2006 (p. 1)). This implies that understanding how to make better decisions would benefit any manager. The following section briefly describes a few of the ways tips and techniques that should be helpful to all wood industry managers.

Luckily, there are several ways to help avoid biases and possibly improve the decision-making that occurs in your operations. The first step is to promote the possible effects of bias and get all your management team to recognize the biases that may be impacting their judgment (and that of their subordinates, customers, etc.). Managers who understand cognitive biases can better evaluate propositions made by subordinates, business partners, or even vendors. Next, managers must take that knowledge and learn to "de-bias" their judgment. Although this is a somewhat complicated process, it has the potential to have positive impacts throughout your operations.

One potentially problematic circumstance that leaders must be wary of is when people are put in new situations. For example, we often promote from within and then expect the managers to know all there is to know about their new position. They may be asked to give a sales forecast for their new territory, but overconfidence or a fear of admitting a weakness pushes them into providing a figure that is not based on fact or experience. This suggests that leaders at the very least be cautious of decisions made by younger employees who are put into unfamiliar situations.

However, leaders must not forget that experienced managers can also suffer from biases. While one might think that the more experience a manager has the better they should be at making good decisions, this is not necessarily the case. In fact, we often see that senior managers are more likely to make poor decisions due in part to the biases that build during long and generally successful careers. A past track record of success is often the cause of disastrous decisions.

A related weakness comes when we benchmark best practices. Many of our trade associations, for example, conduct quarterly tours of mills that are having great success with some new technology. The danger producers face then is that they only get to see the mills that are having great success with that new technology! Producers might learn much more by "benchmarking failure," or looking for those companies that have not had success trying some new piece of equipment or entering some new market.

Managers are advised to remember that nonrational escalation of commitment causes many poor decisions and to learn to watch for it and avoid it. Experts believe that if managers want to consistently make better decisions then they must learn to distinguish between situations where continued persistence will bring positive returns and those where persistence may have big costs (Bazerman 1998).

This may take a change in organizational culture, but procedural changes such as removing initial decision-makers from subsequent decisions can help as well. Another key to avoiding escalating commitment to projects is to remember that sunk costs cannot be recovered and thus should not be included in forward decision-making.

Another core concept for making better decisions is the ability to use data and information more effectively. The first aspect of information use is to effectively utilize information resources that currently exist within an organization. This may require breaking down internal silos that prevent data and information from reaching those who need it to make a key decision. Organizations might also consider a move toward more evidence-based management (Pfeffer and Sutton 2006). Evidence-based management has migrated from helping medical professionals make better decisions into the management realm and shows real promise for helping get the right information into the right places to help make better decisions.

Finally, the organizational systems within many forest products manufacturers could be designed better to facilitate effective decision-making. This could include changing incentive systems that push managers to continue commitments to previous decisions instead of allowing sunk costs to be ignored. Incentive systems are often at fault for discouraging cooperation between functions and units, which is a fundamental cause of informational silos. Often, it will take an outside view from someone unrelated to the organization to get a really good look at entrenched systems, or to provide an unbiased opinion of a critical decision that is about to be made.

Conclusions

Managerial decision-making has a significant impact on nearly all aspects of our industry, and in challenging economic conditions it is even more critical that industry leaders make the best decisions possible. We have presented just a few illustrations of how decisions have had negative impacts on wood producers, and most readers will have their own examples of poor decision-making leading to negative consequences.

Industry leaders need to pay close attention to their own biases, as well as those of their subordinates and their trading partners, and understand how they can impact key decisions and outcomes. A first step is to acknowledge that biases exist, and that the natural tendency for managers is to be overoptimistic and overconfident in their abilities. It would behoove us all to remember that in real life, a manager's knowledge is always incomplete. Time and cost constraints limit the quantity and quality of info available to decision-makers, and this can have a direct impact on a course of action. Human needs and goals will change, and will often override what is best for the company. But with this in mind, leaders can then work to avoid situations where biased decision-making may negatively impact their organization. It should be clear that the way a management team makes decisions can have a significant impact on the firm's operations and profitability.

Beyond personal biases, many wood manufacturers have a great need to change various parts of their systems in order to facilitate better decision-making. This could



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include aspects ranging from corporate culture to incentive programs to data warehousing. Oftentimes, it takes a change of leadership at the top of the company to make a real difference. Louisiana-Pacific is a good example of a corporation where a new top management team made significant, positive changes in an effort to improve long-term competitiveness. Overhauling organizational systems or replacing upper managers are not easy choices to make, but we suggest that they may be the only way for some wood producers to survive.

As practicing academics, we would humbly submit that our colleagues in the various forest products programs in North America and beyond have developed a range of solutions that could have had a much greater positive impact on the industries we serve. From technological innovations (e.g., Hunt 1975, Sliker and Suchsland 1982 Youngquist et al. 1992) to operations management (e.g., Young et al. 2007) to business strategies (e.g., Schuler and Buehlmann 2003), our colleagues have provided industry leaders with a wide variety of tools capable of improving the competitiveness and profitability of their operations.

Unfortunately, we must face the fact that no matter how good our ideas, many companies in the industry will not utilize these solutions. We submit that in many instances clientele have not utilized our proposed solutions due to the manner in which decisions are made by small groups and individual managers. Thus, it may be helpful to acknowledge that such factors as cognitive biases and organizational systems are in many cases the root cause of why our ideas are not adopted. If, as researchers and as a Society, our goal is to strengthen the forest products industry, then we should try to fully understand the forces that prevent us from achieving our potential impact.

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