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Knowledge Management

Leading with an invisible hand

By Ajit Kambil

Adam Smith's ideas about the competitive marketplace can work inside companies as well. Internal electronic markets can convert the widely dispersed knowledge, preferences and beliefs of people within an organization into decisions that can improve resource allocation, predictive abilities—and the bottom line.

Adam Smith's notion of the invisible hand helped revolutionize our understanding of how markets work. He recognized that markets provide real incentives to traders to reveal their beliefs—and by extension to share information—and that the price mechanism is an efficient way to assign value collectively to beliefs and information. Yet more than two centuries later, it is the visible hand of management that still directs most key corporate decisions.

Today, however, technological advances are enabling executives to bring the benefits of a competitive marketplace described by Smith inside their companies, resulting in more efficient resource allocation and improved predictive abilities. In a corporate world where information is widely dispersed within organizations, internal electronic markets can be effective ways to reveal the knowledge, true preferences and beliefs of individuals and to convert that information into decisions that have a significant bottom-line impact.

Industry leader

Consider British Petroleum. For years it has been a leader in practically every aspect of the energy business, including the environment. In 1998 BP group chief executive Sir John Browne pledged that by 2010 the company would reduce its greenhouse gas emissions by 10 percent from 1990 levels.

He proposed to accomplish this goal in an innovative, highly efficient way: BP would use a flexible, internal electronic market mechanism that would allow the company's diverse business units to trade emissions rights with one another. This would help the company determine the most efficient means to reduce overall emissions.

The result: Today BP is recognized as an industry leader in the reduction of greenhouse gas emissions. It was no small task. BP is a large, decentralized company with more than 90 business units. The costs for reducing emissions could vary dramatically by unit: In one it could be extremely expensive to reduce emissions by even 2 percent, while in another it could be relatively inexpensive to reduce emissions by 20 percent.

Managers of the individual units were in the best position to know how to reduce emissions efficiently and economically. Each business unit was given an emissions reduction target. They were then free to pursue those targets by investing in emissions reduction directly or, alternatively, by purchasing reductions in emissions from other business units that were able not only to reduce their volume of emissions but also to exceed their targets more cheaply. For example, if a unit had an increased need for emissions rights due to expanding production, it could use BP's internal electronic market to purchase those rights from another unit that was reducing production, or it could cut its own emissions more cheaply.

The electronic market was set up on BP's intranet. Business units could sell emissions rights at a specific price or could post bids if they were looking to buy. Sales occurred when bids and offers matched. In addition to helping business units allocate their resources efficiently, the system generated important information, such as the cost of abating emissions. For example, emissions rights in March 2001 traded for close to $20 per metric ton.

An internal market like BP's requires regulation and authentication, in much the same way external markets do. To make it work, BP first had to estimate and then verify its prior and current emissions. Next, divisions were told they would incur a clear and tangible financial penalty for not meeting their emissions targets. Finally, the emissions savings that were claimed needed to be verified to build trust in the market.

Internal markets can be used in other ways as well—forecasting sales, for example, which is a challenge for most organizations. Sales teams have the best knowledge of their customers, of course, including their likely purchase patterns. Yet salespeople often receive a bonus when they exceed their quota; they therefore have an incentive to underestimate their sales forecast. This underestimation can create problems with production.

To generate better forecasts, Charles Plott, an experimental economist at the California Institute of Technology, and Kay-Yut Chen, a corporate economist, created a special system of internal markets for predicting sales at a major computer company. This system sought to tap the collective knowledge of the entire sales staff rather than that of a select few salespeople who served particular customers.

Each participant was given an initial allotment of approximately 20 shares in each of 10 different markets; each market was connected to one of 10 different sales scenarios for a specific product—zero to 1,500 units of the product sold, for example, or 1,501 to 1,600, 1,601 to 1,700, and so on. Each market was identified by the event to which it was connected.

The markets were open for several days, during which time participants could buy and sell shares according to their beliefs about the likely level of sales for a particular month. When the final sales figures were posted, those who owned shares in the stock whose "event" or face value (for example, 1,501 to 1,600 units) included the actual sales (say, 1,585 units) were paid $1 per share.

Because the share prices ranged from zero to 100 cents, they could be interpreted as probabilities. Thus, if a stock that represented a sales range of zero to 1,500 units had a price of 9 cents per share, the probability that sales for a particular month would be in the range of zero to 1,500 would be 0.09, or 9 percent. The exercise was conducted 16 times inside

Hollywood market makers

In addition to using market mechanisms to mine internal sources of knowledge (see story), companies can use them to gather information from groups outside the company.

The Hollywood Stock Exchange was created in 1996 as a gaming site and is now used to predict the likely sales from movies and records—even Academy Award winners. It issues "shares" in movies, artists and music. Customers register for free and then get 2 million "Hollywood Dollars," which they use to buy and sell shares. As more people buy particular shares, the value of a movie or an actor increases. Thus the stock price reflects the traders' prediction of box office performance or a star's likelihood of winning an Oscar.

Hollywood Stock Exchange players correctly picked award winners in eight out of eight categories for the Academy Awards in 2000; each actor with the highest final price won an Oscar. By contrast, that same year *The Wall Street Journal* polled actual Academy voters, who got only seven out of eight winners correct. The site also forecast the unexpected success of *The Blair Witch Project*. (More recently, the Hollywood Stock Exchange correctly picked six out of eight categories for the Academy Awards in 2001 and five out of nine Oscar winners in 2002.)

the company. In all but one case, the market mechanism generated a prediction that was significantly closer to the actual sales than the traditional sales forecast.

Valuing unknowns

There are many different ways to use internal markets. At the Massachusetts Institute of Technology's Sloan School of Management, researchers are testing the use of these markets to value different product features. Caltech's Plott notes the potential for wide-ranging business applications, such as predicting the value of legal judgments. In addition to sales forecasting, internal markets can be used to evaluate product design, new technology developments, or investments in research and development. They could even value ventures and other uncertain opportunities.

Once these markets are established, management can enhance their value by including message boards on which traders can post the rationale for a trade. Understanding the why behind a trade can provide management with critical insights.

Using Adam Smith's ideas to help create internal markets can produce real benefits for a company. But as stock market bubbles teach us, the

information and signals generated by markets are not perfect—they reflect the best social consensus of participants at any time.

Examples in both practice and laboratory experiments indicate that markets can and do make mistakes. To improve the effectiveness of internal markets and the value of the information they produce, companies must ensure that there are enough traders in their markets (a critical mass); that the people who trade represent the group that is knowledgeable about the issues the market seeks to address; and that there are sufficient incentives to motivate traders to trade and generate useful information.

In addition, using these new tools effectively will require executive commitment, leadership and the alignment of market initiatives to the culture of the company. Not all companies will be able to do this. Internal markets require executives to give up some of their authority to the "invisible hand" of many decision makers. Companies that are decentralized and allow significant autonomous decision making are much better candidates for internal markets than those with strong hierarchies or cultures in which information sharing is not recognized and rewarded.

As multinationals get bigger, leaders will be challenged to manage diverse operations while achieving consistent companywide goals. Instead of imposing a one-size-fits-all solution from the center, executives can use internal markets. Indeed, their use may be critical to making large companies nimble and effective competitors in a more volatile world.

Ultimately, the leadership choice for CEOs will be to decide when the certain authority and decision making of the visible hand is better than the freedom of choice and uncertain outcomes of the invisible hand.

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