

ARTS

Innovation Far Removed From the Lab

By PATRICIA COHEN FEB. 9, 2011

Daniel Reetz loves trash bins. A big one in Fargo, N.D., was where he found most of the materials he used to build a scanner that was fast enough to scan a 400-page book in about 20 minutes without cracking the binding. The two Canon PowerShot A590 cameras and two lights that he lashed together with a few pieces of acrylic and wood cost him about \$300 in all, considerably less than the \$10,000 commercial book scanners that were on the market.

When he was finished, Mr. Reetz, now 29 and working at Disney Research's laboratories, put his 79-step how-to guide on a Web site. Since the post went up nearly two years ago, about 1,000 people have joined Mr. Reetz's forum, and about 50 have built their own scanners from castoff furniture, aircraft aluminum, whiskey boxes and plastic foam.

Do-it-yourselfers like Mr. Reetz may not know it, but their tinkering is challenging a deeply entrenched tenet of economic theory: that producers, not consumers, are the ones who innovate.

Since the Austrian economist Joseph A. Schumpeter published "The Theory of Economic Development" in 1934, economists and governments have assumed that the industrial and business sectors are where ideas for products originate. A complex net of laws and policies, from intellectual property rights to producer subsidies and tax benefits, have flowed from this basic assumption.

However, pathbreaking research by a group of scholars including Eric A. von Hippel, a professor of technological innovation at M.I.T.'s Sloan School of Management, suggests that the traditional division of labor between innovators and customers is breaking down.

Financed by the British government, Mr. von Hippel and his colleagues last year completed the first representative large-scale survey of consumer innovation ever conducted.

What the team discovered, described in a paper that is under review for publication, was that the amount of money individual consumers spent making and improving products was more than twice as large as the amount spent by all British firms combined on product research and development over a three-year period.

“We’ve been missing the dark matter of innovation,” Mr. von Hippel said from his office in Cambridge, Mass. “This is a new pattern for how innovations come about.”

Carliss Y. Baldwin, a business administration professor at the Harvard Business School, called the research remarkable, adding: “What makes Eric’s work so significant is that it is unprecedented to try to measure the extent of user innovation. He shows that we’ve had on a set of mental blinders.”

To Ms. Baldwin and others who study innovation, the results point to the necessity of rethinking patent law as well as government incentives for research and open sourcing. As Stian Westlake, executive director of policy and research at the British National Endowment for Science, Technology and the Arts, put it in a report: “This democratization of innovation has potentially critical implications for innovation policy.”

The types of product modifications and innovations that Mr. von Hippel’s group found among the nearly 1,200 people surveyed ranged from the most elementary to the complex. One woman colored two halves of a clock dial different shades to teach her children how to tell time; a man concocted a device made from a fishing rod and a large hook to trim his treetops; another reprogrammed his GPS unit to make it easier to use and tailored to his needs.

The Internet is an obvious engine of consumer innovation in the digital realm. Twitter’s List and Retweet features, for example, were inspired by users. While consumers have always fiddled with products, the Web makes it so much easier for people with similar interests to come together and form online communities like DIYbookscanner.

The very study of collaborative user innovation is a relatively new phenomenon that began only in the mid-1990s when advocates for open-source software began to argue that computer code should be freely available for thousands of independent minds to play with and improve. “They overturned the widely held model,” Ms. Baldwin said.

The Western tradition of the isolated heroic genius toiling away in a lab or study is based on myth as much as fact, she added. That model has had a powerful impact, helping to discount the more collaborative aspects of innovation, but it is “completely dated,” Ms. Baldwin said.

Mr. von Hippel, who has been researching innovation for 30 years, estimates that when it comes to scientific instruments 77 percent of the innovations come from users. Fields like medicine can be particularly fertile for creative tinkering. A classic example of user innovation is the heart-lung machine. In the late 1930s Dr. John Heysham Gibbon approached manufacturers about building one, but they did not know how to do it or whether there was a

market for it. So Dr. Gibbon spent years developing one himself before this essential device was manufactured commercially.

Sport enthusiasts, like windsurfers, cyclists and fly fishermen, commonly modify equipment. William W. Fisher III, a Harvard law professor and an active ice climber, was one of the enthusiasts who in the 1970s had the idea of adding a leash to ice hammers and axes so they could hang on them while climbing frozen waterfalls. Other climbers followed suit. In time, manufacturers incorporated the leashes into their products.

As consumer innovators proliferate, the tensions with producers have escalated, and the courts are increasingly going to be called in to adjudicate, Mr. Fisher predicted. He is skeptical that easing intellectual property law would significantly spur economic efficiency, but he does say it would foster creativity and community. In a recent article in the *Minnesota Law Review*, Mr. Fisher argues that altering equipment — like music, novels and other cultural artifacts — is a way of expressing creativity, and that the law should take that into account. “User innovation,” he writes, “offers opportunities for self-fulfillment.”

Mr. von Hippel said that the Finnish and Portuguese governments were financing him to conduct research similar to the British survey. As for the United States, he said, “there doesn’t seem to be as much interest here.”

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