

Many of the patents companies file are useless. So how do firms create real breakthroughs?

From Tesla to OpenAI, every company wants to be at the center of the next big innovation. But what actually counts as a breakthrough? And how should we measure it?



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For decades, researchers and investors have relied on two main approaches to measure innovation. One measures technological impact through forward patent citations: the number of future inventions that build on a patent. The other measures economic value through stock market reactions when patents are granted.

Most patents score poorly on both counts. In 2024, patent filings [reached a record 3.7 million](#) worldwide, according to WIPO. Yet research consistently shows that many patents are never used by the companies that file them. Fewer than 10% generate enough value to justify the cost of securing them.

Meanwhile, a tiny minority account for most of the returns. Depending on the industry, the top 10% of patents generate between 48% and 93% of total economic gains. But what is surprising is that it is not the most technologically extreme breakthroughs that lead to the most economic gains. In fact, only 9% of technological breakthroughs also become economic breakthroughs.

IESE professor [Giovanni Valentini](#) and coauthor Giacomo Marchesini (Copenhagen Business School) [parsed the data](#) and found something strange: Among the most extreme inventions, the relationship between technological quality and economic value actually turns negative.

The patents most likely to reshape an industry are often the least likely to generate immediate profits.

Is there a disconnect between invention and value capture?

Consider a 2002 Coca-Cola patent for an “on-demand carbonation system” that injected CO₂ into drinks through a dispenser connected to pressurized gas and water sources.

Technologically, it was not especially groundbreaking. Over a decade, it received only four forward citations. Economically, however, it was a huge success. Thanks to Coca-Cola’s scale, distribution and brand power, the patent ranked in the top 1% of its technological class for economic value.

Now compare that with a patent filed in 2000 by Healthetech Inc., a small company developing wearable physiological monitoring systems. The technology was years ahead of its time. It later became foundational for wearable health devices and accumulated hundreds of citations from companies including Apple, Garmin and Abbott. Commercially, though, the patent failed. Healthetech lacked the manufacturing scale, partnerships and market reach needed to capitalize on the invention. The patent eventually lapsed after nonpayment and generated little direct economic return.

In other words, breakthrough technologies do not automatically become breakthrough businesses.

Why the best technologies often make the least money

The answer for why the best technologies often make the least money comes down to three forces: novelty, complementary assets and competitive dynamics.

First, highly novel inventions are difficult to commercialize. Radical technologies may influence entire industries, but inventors still need factories, distribution, supply chains, regulatory expertise and customer relationships to capture value from them.

Second, companies with those assets usually face intense competition. Once a market becomes commercially attractive, rivals move in quickly, compressing margins and reducing

profits.

That creates a tension between value creation and value capture. The firms advancing technology furthest are not always the ones best positioned to profit from it, and those that are well positioned soon come up against market forces.

The companies that win play with time and assets

The companies that consistently outperform understand this structural tension. Rather than betting everything on a single technological trajectory, they spread innovation efforts across multiple technology S-curves at different stages of maturity. Some projects focus on early-stage experimentation and technological novelty. Others focus on scaling, commercialization and extracting value from established markets.

What ultimately separates successful breakthroughs from failed ones is often not the technology itself, but the ecosystem surrounding it. Large firms often control brands, manufacturing systems, distribution networks and customer access, allowing them to capture value more easily. Smaller firms, meanwhile, are often better at producing radically new ideas because they are less constrained by existing business models.

That is why breakthrough innovations frequently emerge from startups and are later acquired by larger firms with stronger complementary assets. Coca-Cola did not invent diet soda. Apple did not invent the smartwatch. In both cases, they were simply the companies best positioned to scale and monetize the idea.

What firms should learn

The first lesson is simple: there is no single measure of innovation success. One patent can transform an industry without making much money while another can generate billions while contributing little to technological progress.

The second lesson is that diversification alone is not enough. Firms need temporal diversification across technologies at different stages of development. If every project sits at the same point on the development curve, companies are unlikely to generate both breakthrough science and breakthrough profits at the same time.

And the third lesson is that complementary assets are everything. Having the means to scale and commercialize your invention is key. If you don't have it, find a way to work with a company that does.

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