



Product Development Innovation Productivity Is Declining

Over the past decade numerous studies and research efforts have consistently found that R&D productivity, a synonym for efficiency, is declining—across all industries. Indicators come from a number of sources across several different domains.

Eroom's Law: From our daily life experience, many of us have already heard about the woes of the pharmaceutical and biotechnology industries. The decline is so prolific that a study published by *Nature* coined a new law, "Eroom's Law." Eroom's Law is the opposite of the well-known Moore's Law, which describes the geometric growth of computing power over time. Thankfully, the Eroom trends are not as alarming in other industries.

Intellectual Property Indicators: Patents are one measure of innovation productivity. *Thomson Reuters' 6th State of Innovation Report* in 2015 showed a slowing in the growth of global patent filings from 20% in 2012, to 17.7% in 2013, to 3.3% in 2014. The absolute number of filings is increasing, but the growth is slowing. Thomson spun out Clarivate Analytics and their *8th State of Innovation Report* in 2017 showed growth at 8%. The news is possibly better in the U.S. and Europe. China now accounts for six of every 10 patented inventions and has slowed disproportionately.

Research Quotient Indicators: A metric invented just five years ago, Research Quotient (RQ), is the first of its kind. It seeks to tie the inputs into R&D to the outputs from R&D, true R&D productivity. Given two- to five-year development cycles followed by two- to five-year commercialization cycles, RQ takes some work to calculate. But we are now in the era of big data. Metrics are a byproduct of analytics. The third HBR Article on RQ, "Is R&D Getting Harder, or Are Companies Just Getting Worse At It?" (March 2017), uses three decades of data to show a 65% decline in R&D productivity. My apologies to all readers, please don't shoot the messenger. Further, comparing these 30 years' worth of data to U.S. GDP over the same period shows a near parallel relationship to U.S. GDP decline.

Innovation Productivity: To what extent does innovation drive productivity? Does anyone really know? There was a great reset in 2004 of a 1945-era assumption that *BusinessWeek* reported in "R&D: How Big A Boost. It was long-held by U.S.

federal agencies producing statistics that R&D accounted for 70% of resultant domestic productivity. But known errors had never been investigated. It is now believed R&D's real impact is closer to 10% to 20%. Say what? Estimates were a factor of 3.5 to 7 off? Quite a miss. This case makes the point that current understanding of R&D, Product Development, Innovation, and Productivity interrelationships is ripe for investigation. Companies and governments are early in their learning curve to correlate the relationship between R&D investment, R&D output, and R&D's resultant impact on the economy.

For me, 70% was too high and 10 to 20% is too low. As well, R&D will likely have a greater impact in the years ahead. Automation has already replaced much of the labor in distribution and production, and is now entering retail and administration. R&D, Product Development, Innovation, and IP will play increasing roles in driving industries and overall domestic productivity.

Common-Sense Productivity: It is well known that recessions cause five-year declines in product pipelines. Companies cut back the stretch-innovation items in their pipeline and turn to incremental products (<http://www.machinedesign.com/community/six-departments-innovation>). After the five-year lag from 2001, the pipeline restarted in 2006 and lasted about three years. Then came a pipeline drought from 2009 to 2016. Unlike the great run in the 1990s, the pipeline has been quite challenged the past dozen years.

Common sense says that new-product sales are generally the best category of sales a company can have. Those sales emanate from R&D and product development. While these several aforementioned trends are troubling, the great thing about being a product innovator is you really can see the results of your work in the marketplace. Your company can see that its share of revenues and profits from new products, technology licensing, and intellectual property is increasing. Those are some common-sense indicators. **ml**

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