



R&D Spending Level: What is your Research Quotient?

Determining how much to spend each year on R&D and product development is an issue that has plagued management for decades. In last month's column, "R&D Spending Level: What is the Right Amount?", several traditional methods used by R&D leaders to determine R&D spending levels were discussed. This month, we examine an approach that is barely five years old.

The goal of R&D spending is clear and commonly shared: Companies seek to maximize their return from R&D investments. Just a few years ago, a comprehensive approach that correlates R&D spending to financial results did not exist. Coming up with one became a passion for Anne Marie Knott, a professor at Washington University in St. Louis, who began her career as a mathematician in the think tank that was formerly Hughes Aircraft.

RQ Underpinnings: Building off a long-accepted method used by economists to calculate productivity, Knott sought to remove imperfections in the Total Factor Productivity method used by economists, but does not isolate productivity gains which directly emanate from R&D. She named the method Research Quotient (RQ). With the help of grants from the National Science Foundation and access to five decades of public company 10K financial data, Knott ironed out an equation that has been proven to correlate R&D spending to business and financial results.

RQ Importance: In my years of having the privilege to write this column, my article has never focused on the work of one person before. But, that is the case this month. Advancing the management science of R&D is extremely important. For four decades, products have continued to fail (or succeed) at the same rates across industries. Management's tools to determine spending levels have remained the same. Numerous articles citing systematic R&D productivity declines across industries abound. All the concurrent, lean, flexible, agile, rational, sprint, scrum, Six Sigma, and other tactical improvements have only incrementally changed the bottom-line yield from R&D. Far from perfect, there now exists an approach that correlates input with output that is accessible to just about every company. It is my hope that this article will broaden the awareness of RQ and advance the science of funding R&D.

RQ Parameter: The RQ equation takes into account all the things one would expect to find when trying to maximize R&D productivity: capital investment, R&D spending, labor, margins, profits, technology transfer, and advertising investment (vs. marketing) for commercialization purposes. All of these figures are required to be reported, with the exception of advertising which is inconsistently reported. In the aggregate, that's a nit. We're not going to pick at the nits. They will take care of themselves with time.

RQ Findings: Let's examine some of the significant findings derived from studying how some public companies conducted R&D from 1965 to 2011, as published in Knott's 2017 book, *How Innovation Really Works*. First, 63% of companies overspend and 33% of companies underspend. This means only 4% of companies spend in the range that might result in optimal innovation productivity. Second, in the big picture, innovation productivity has declined 65% over four decades. If companies are systematically heading south, your company might be able to head north. Third, RQs for best-practice companies are four times the industry average. Fourth, mean RQs across industries vary only slightly, which adds legitimacy to RQ. At the same time, there is great variance within each industry which presents significant competitive opportunity to strive for a 4x best practice. Lastly, RQ can't be gamed. If your company's RQ is good, it actually means your company is good.

RQ Opportunity: In closing, to quote the last page of Knott's book, "RQ is the single most significant predictor of monthly stock returns over the past 47 years." Check out RQ if you haven't yet. When you dig in, you will find nits to pick. But, isn't that the case with every single new-to-the-world innovation? Your company can be one of the leaders that helps to refine this emerging management science—and be among the first to attain its financial benefits. **md**

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