

NYU Stern School of Business
Department of Information, Operations & Management Sciences
OPERATIONS MANAGEMENT RESEARCH SEMINAR

TOPIC: Small Modular Infrastructure

SPEAKER: Garrett van Ryzin

DATE: Wednesday, October 10, 2012

TIME: 11:00 AM-12:00PM

PLACE: 5-90 KMC

ABSTRACT

In many basic infrastructure industries -- transportation, electric power generation, raw material processing, etc. -- we have witnessed a trend of ever increasing unit size. Several factors have driven this trend. Basic geometry -- how length, area and volume scale with size -- often, but not always, imply lower capital costs and higher conversion efficiency as one increases unit size. Reducing fixed labor costs is another primary motivation behind the trend of ever larger unit scale. However, advances in technology, most notably the ability to automate at low cost, together with a more comprehensive view of the costs and benefits of unit scale, argue for a reversal of this "bigger is better" trend -- a radical shift to a world in which efficiency of size is replaced by efficiency of numbers, in which custom built plants of massive unit scale are replaced by massive numbers of small, modular, mass-produced units deployed in parallel in single locations or distributed geographically. To make this case, we develop a framework to evaluate the economics of unit scale. We then illustrate the framework on several industry sectors and argue that under plausible assumptions, many industries are nearing -- or already are at -- a tipping point toward radically smaller unit scale. Such a transformation would have profound implications for the structure of both established and emerging industries.

[This is joint work with Eric Dahlgren and Klaus Lackner, Department of Earth and Environmental Engineering, Columbia School of Engineering and Applied Science, and Caner Gocman, Columbia Business School.]

BIOGRAPHY

Garrett van Ryzin is the Paul M. Montrone Professor of Decision, Risk and Operations at the Columbia University Graduate School of Business and Chair of the Decision, Risk and Operations Division of the School. His research interest includes analytical pricing, stochastic modeling and operations management. He is coauthor of the book *The Theory and Practice of Revenue Management*, which won the 2005 Lanchester prize for best published work in operations research. He is an INFORMS and MSOM Fellow. Garrett received the B.S.E.E. degree from Columbia University, and the degrees of S.M. in Electrical Engineering and Computer Science and Ph.D. in Operations Research from MIT.