

Preface

Like many research projects, this book project started with a personal journey. I have been studying economic development and innovation for the past two decades. During my doctoral program at Berkeley, California, I examined the engineering processes of making innovation at multinational corporations, a study that resulted in my previous book, *Global Companies, Local Innovations* (Motoyama 2012). Despite the current global age, a multinational company must co-locate its research and development (R&D) functions in its core region due to the uncertainty of innovation processes, as well as the engineering and organizational management of those processes.

As a postdoc, I studied the scientific development of nanotechnology and its policy environment. The US federal government enacted the National Nanotechnology Initiative in 2001 to distribute \$2 billion per year, justifying the technology initiative for the economic competitiveness of the nation (Motoyama et al. 2011). However, much of the government funding went to basic research at universities. Since it takes years, or even decades, to guide basic research into commercialization, the mechanisms, processes, and effectiveness of the government funding were still in question.

In 2011, my career turned a new corner when I joined the Kauffman Foundation, a philanthropic organization dedicated to the promotion of entrepreneurship. To me, it was a natural extension of my research: I studied innovation at multinational corporations and scientific development at universities. Now is the time to study entrepreneurship which can bridge science, technology, and innovation. I was particularly interested in learning the process of commercializing cutting-edge innovations, like nanotechnology, in the form of entrepreneurship. How do entrepreneurs find such technologies and commercialize them? How do technology transfer offices at universities get involved? How well does the current policy environment support that process?

The Kauffman Foundation opened the door for me to meet a

number of entrepreneurs: from young and bright ones to senior and experienced ones. People who just want to be entrepreneurs and who are struggling to take the first step to start a company. Entrepreneurs who were scaling up companies massively for personal, family, or social reasons. Even accomplished players like Steve Case of AOL, Brad Feld of TechStars, and Jeff Hoffman of Priceline. It is always refreshing to meet and hear from people who are really innovating and driving the economy. In meeting them, I often started with basic and exploratory questions: What is your business? How did you come up with the idea? What kind of challenges did you face and how did you solve them?

It took several months, but I started to find some patterns. And those patterns were unexpected, at least for me at that time. Nobody was using cutting-edge science or engineering technologies, like nanotechnology. Almost nobody mentioned patents. No company came out of universities. Well, not exactly – some entrepreneurs did use cutting-edge technology and had patents that came out of universities, but they were only a few out of a couple of hundred. Clearly, those were rather exceptions than the norm, and something else was going on. My research questions about technology and commercialization were not answered, or rather my questions were missing and did not fit the big picture in entrepreneurship. Entrepreneurs were not the people to discover or dig out cutting-edge technologies to commercialize them, but they were the ones to envision markets by identifying something that did not exist before or where nobody was offering anything better. Of course, entrepreneurs used various technologies, but not necessarily cutting-edge ones. There were many ways to run businesses, and entrepreneurs were the people who could find available technologies and combine them to make things happen. In other words, more than 90 percent of cases I have observed told me that technology did not create markets or businesses. Entrepreneurs created markets. Then, entrepreneurs later found technologies to make their businesses and markets happen.

As mentioned, this finding was unexpected, because that is not what the currently dominant theory of innovation suggests, or how the policy is framed. Under the current theory, innovation will occur after scientific development takes place. The process is, or should be, straightforward and linear: The government funds a university for scientific research. Researchers develop cutting-edge technologies. Universities make those technologies available, but protect the

intellectual property with patents. Technology transfer offices at universities mediate among entrepreneurs, companies, and industries that ultimately use those technologies for their own products and services.

In short, the model that current innovation theory and policy promotes does not fit most of entrepreneurship, but targets a small minority of business development. To be fair, there are cases that the current innovation theory fits. For instance, in the pharmaceutical industry, a company can import a newly formulated drug from a university and mass-produce it for consumers. That company requires an initial investment of millions to conduct lab experiments and survive the lengthy review by the Food and Drug Administration (FDA). Alternatively, you hear stories about how the Defense Advanced Research Project Agency (DARPA) created the Internet (Zook 2005; Greenstein 2015) or how Google, Yahoo, and Cisco came out of universities. However, these stories are uncritically retold (Lester 2005) without examining whether or what kind of technologies these companies used from Stanford University, or how commonly such cases occur.

Motivated to investigate this theme deeply, I organized several research projects to examine the questions quantitatively with nationwide data and explore qualitatively with multiple regional cases. I was fortunate to have several collaborators on different projects and to have excellent research assistants at Kauffman. This book synthesizes our findings and presents an alternative model of economic development based on entrepreneurship.