Chapter Six

Innovation

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In the 2010 National Security Strategy articulated by the Barack Obama administration, prosperity is identified as the second of four U.S. national interests. Specifically, the United States seeks a strong, innovative, and growing economy. Focusing on *innovative*, as it relates to economic security, the term *economic prosperity* is probably more appropriate. Innovation is appealing intellectually and psychically. Despite 32 years in the Intelligence Community, I have come to realize that my cognitive orientation is essentially a progressive one. I am much more interested in what can be than in what is.

We are living in one of those spurts of progress and innovation that punctuate human history on a fairly regular basis. I am inclined to believe the impact of the changes we are seeing now will have particularly profound—dare I say, unprecedented—consequences. For my purposes, it is enough that technological and process-based changes and improvements are bunching up right now like beach traffic on a beautiful Friday afternoon.

So how critical is it to our economic and national security for the United States to be an important driver of this innovation caravan? To answer that question adequately, there are four additional questions that must be explored.

1. How important is innovation to the overall economic health of the United States?
2. Where does the United States currently stand in the world's innovation index, and how are we vectoring?
3. How do our likely peer competitors compare to the United States in their innovation potential?
4. What is contributing to the conditions described in the answers to questions 2 and 3? What are the causes and correlates?

Using the approach of the so-called objective intelligence analyst in answering these questions, the following lays out what is known and not known about this topic, according to my view of reality.

Before proceeding to answer the questions, let us explore some definitions of *innovation*. The World Bank, in a recent report on agricultural innovation, defined it generally as neither science nor technology but as the application of knowledge of all types to achieve desired social and economic outcomes. Specifically, innovators master and implement the design and production of goods and services that are new to them and/or their societies.

People speak of many different types of innovation. The taxonomy of innovation is usually presented in the form of paired concepts that are in opposition to each other. So, for example, people speak of fundamental innovation, which is often technology-based and leads to new industries, as opposed to social innovation, which refers to changes in the way people behave. These changes in societal behavior—for example, most people adapting to cell phones or global positioning systems—are often essential to harvesting the advantages of fundamental innovations.

There is process-versus-product innovation; the experts generally agree that product innovation often creates jobs, but does it lead to a net increase in jobs? After all, new products usually displace the individuals working on the old products. Process innovation, however, usually eliminates jobs as few innovators seek to increase labor costs through process improvement.

Then there are several dual taxonomies that are generally describing similar qualities—the extent of change. Is the innovation revolutionary or evolutionary? This usually is assessed in terms of outcome. Is the innovation radical or incremental? This usually distinguishes ease of adaptation. Is the innovation continuous or discontinuous? This distinguishes those innovations that trigger mass extinctions from those that do not.

A final taxonomy pair distinguishes fundamental innovation from applied innovation. In this case, fundamental innovation involves science and engineering leading to a completely new paradigm, whereas applied innovations take these paradigm shifts and turn them into something utilitarian and, in some respects, pedestrian.

Now that the definitions are explored, let us return to the four questions originally asked. First, how important is innovation to the overall health of the U.S. economy?

Although some of the subsequent questions have less clear or authoritative answers, the facts here appear to be without controversy.

Everyone agrees that innovation has accounted for most U.S. economic prosperity in the post–World War II period. The Department of Commerce notes, for example, that technology innovation is linked to 75 percent of U.S. economic growth since the war.

Perhaps less appreciated is the unique role that venture capital and the modern private equity firm had in fueling post–World War II economic growth. It is generally agreed that the venture capital industry really began in the United States in 1946. There was private investment before then—the Transcontinental Railroad was a startup—but the investors were rich individuals acting on their own. This is a trend that the country appears to be returning to as the amounts required by startups decline precipitously as a result of Web services and cloud computing. Venture capital firms in the postwar environment began by investing in the new businesses started by returning veterans. This was a uniquely American concept at the onset, but Europe caught up by the 1990s.

Venture capital reached its highest percentage of gross domestic product (GDP) in the mid-1990s at just about 1 percent, but the cascading effects of venture capital are more significant. The National Venture Capital Association estimated in 2003 that ventured-backed companies were then providing more than 9 percent of all U.S. employment.

We do not have to take the lobbying group's word for it. The Organisation for Economic Co-operation and Development (OECD) estimates that in the United States, firms less than 5 years old have accounted for almost all of the new jobs created in the economy in the last 25 years. Put another way, established companies have essentially created no net new jobs during that same period. The Kaufman Foundation, in a recent study based on a new set of data from the government called Business Dynamic Statistics, analyzes that firms more than a year old actually have destroyed more than a million jobs net since 1977.

There does not appear to be a breakdown of exactly how these new jobs link to innovation, but many of the new firms every year are based on some type of innovation, whether it is fundamental, applied, or social.

The capacity for innovation has been the primary catalyst of U.S. economic growth. Indeed, capitalism essentially is built on innovation and the concept of creative destruction. Going forward, innovation will be even more critical to U.S. economic prosperity. And that is because our particular economic circumstances today imply that innovation not only will need to contribute to all U.S. economic growth but also will have the additional burden of compensating for antigrowth dynamics

currently infecting the U.S. economy—specifically, the financial crisis and the necessary deleveraging taking place.

Economists agree that the hangover from a debt crisis is the worst kind of economic problem and lasts the longest, and this economic downturn is made worse by a simultaneous disruptive secular shift in the economy, from analog to digital. Unemployment will stay stubbornly high because companies are using this downturn to divest themselves of employees and occupations they no longer need in a digital and knowledge economy. There are some economists who have argued that a similar dynamic deepened the Great Depression, which was the occasion that finally allowed for the complete unwinding of the agrarian/horse economy that had dominated the United States during the 19th century. The only elegant way for the United States to resolve its deficit issues is to grow out of them. A nice average 5 percent per annum growth rate for the next 10 years might be a good place to start, but it will be unachievable without the frisson of significant innovation. It may be unachievable without a concurrent effort to reduce spending.

The mature nature of the U.S. population is another serious issue in this discussion. Although there is considerable difference of opinion among academics as to how population growth affects economic growth, particularly for underdeveloped and developing economies, most agree that the declining and aging populations of Western Europe and Japan necessarily cut into economic demand. The U.S. economy is not there, largely because of the positive impact of immigration, but we are also no longer going to benefit from the economic boost that was provided by the consumption patterns of the baby boomer generation.

So having established that innovation is critical to the future of the U.S. economy, let's turn to the question: how are we doing in terms of innovation—specifically, given the focus on national security, relative to other countries?

Measuring where countries stack up on an "innovation table" appears to have become a cottage industry in the last 10 years. There are two recent and credible studies that we can cite. A report compiled by the Boston Consulting Group and the National Association of Manufacturers that measures innovation inputs and outputs has the United States ranked eighth in the world. A second report by the Economist Intelligence Unit (EIU), sponsored by Cisco, has the United States ranked fourth.

These studies are not very exact or agreed upon. Although most people concur on what innovation inputs are, such as a skilled work force, education, research and development (R&D) expenditures, and so forth, innovation outputs are another matter. For example, the number of patents, a popular metric, is criticized by some who argue that patents only indicate inventions and societal concepts of intellectual property, not innovation.

It may not matter that Iceland or Switzerland is considered more innovative than the United States. Neither country will become a threat to national security any time soon. On the other hand, these studies underestimate where China is; the status quo always underestimates the "new kid on the block" because the status quo owns the yardsticks. That said, however, China's status as a holder of U.S. debt will be a strategic problem for the Nation long before China's innovation capacity. It should matter in the long term, of course, but by then China will be dealing with its own structural problems, such as the graying of its labor force.

There is, however, no doubt that the U.S. capacity for innovation has declined in relative and absolute terms over the last 20 years or so. Our standing has consistently declined. Other evidence points to a less vibrant American economy. For example, according to Deloitte's Center for the Edge, the rate of return of U.S. assets has declined by 75 percent since 1965.

How do our likely peer competitors compare to the United States in terms of their innovation potential? We have already discussed China's innovation performance and the methods of measurement that discount China's progress. According to these studies, other potential national security concerns for the United States, such as Russia, are essentially nonissues when it comes to economic innovation. Given its strong performance on pure scientific research, Russia retains the potential for military innovations, but its economy, which is dwarfed by China's in any case, is increasingly based on exploitation of natural resources and is not poised for strong growth or innovation.

The European Union (EU) and China are the two coherent economic powers that could deny the United States leadership—or a significant share—of the economic innovations that will shape the 21st century. But if Goldman Sachs was correct in recent projections, a broader trend, the emergence of the BRIC economies—those of Brazil, Russia, India, and China—will fundamentally alter the world economic

map by 2020. Goldman Sachs may regret its inclusion of Russia in this list, given the developments of the last decade. The EIU, indeed, only speaks of the BIC. The Goldman Sachs report states:

> Our baseline projections, underpinned by demographics, a process of capital accumulation, and a process of productivity catchup, envisage that the BRICs, as an aggregate, will overtake the U.S. by 2018. In terms of the size of the economy, by 2020, Brazil will be larger than Italy. India and Russia will be individually larger than Spain, Canada, or Italy. By 2020 we expect the BRICs to account for a third of the global economy and contribute about 49 percent of global GDP growth.

Joseph Stalin said that quantity has a quality all its own. This kind of change in the global economy will have profound effects on the world that we in the West are inclined to not even want to think about. And it only serves to underscore the argument that U.S. economic prosperity depends upon our capacity for innovation; only innovation will allow us to fight above our weight class, that is, the absolute size of our economy—largely a function of demographics and maturity.

While many of the most innovative countries are in the EU, it is still hard to imagine the circumstances by which the EU would become a peer competitor for the United States, which returns us to China. Although China, in the EIU survey, is projected to rise to 50th in the Innovation Index by 2013, its low ranking is deceptive. China has risen 9 places in just 5 years, a rate faster than the EIU anticipated. In a separate study of innovation in BRIC economies published in *Research Technology Management*, it was noted that in 1995, China's patent count was the same as Brazil's. Now, it is seven times that of Brazil.

John Seely Brown and John Hagel, at the 2006 Davos conference, asserted that China is now the world leader in management innovation. The methodologies used to rate innovation by country are based, unavoidably, on how the West has done it and thus have a tendency not to appreciate how countries such as China, Brazil, and India might be doing things differently.

In theory, China's (or any other country's) success at innovation need not pose a problem for the United States. But it can affect U.S. economic capacity if U.S.-based multinationals choose to divert more of their R&D efforts to China, which is graduating scientists and

engineers at an incredible rate. The United States is lagging badly on science, technology, engineering, and mathematics (STEM) education. If Chinese and Indian graduates stop wanting to work and live in the United States, our innovation potential suffers. By some estimates, Indian immigrants lead up to a third of the startups in Silicon Valley. Finally, the economic advantage of innovation, that of surplus income, goes to those who do it first and well. The more countries that have the skilled workforce and modern economic base for innovation, the harder it will be for the United States to be first to the pole.

Let me be clear here. I am not suggesting any malice or nefarious intent on the part of any other nation. These trends have impact regardless of the policies of specific governments. It is really just a matter of physics and arithmetic.

Why is the United States losing momentum in economic innovation? The literature presented several compelling reasons. We have already discussed one: falling behind in STEM education. Given the size of China's and India's populations, we will never be able to match them numerically, but at the rate we are going, the United States will simply be overwhelmed.

A second related issue is a current workforce that needs new training and skills.

A third reason is the inadequate U.S. Federal and state government support for an innovation-friendly environment. We lag behind many other parts of the world. For example, the United States ranks 17th among OECD countries in the generosity of its tax credits for R&D. France is four times more generous than the United States, according to the Information Technology and Innovation Foundation. This is not good.

A fourth factor points to the short-term perspective of too many U.S. companies and their outdated and myopic management/leadership concepts. Steve Denning, a leadership consultant, notes that the management principles of most U.S. companies are scalable bureaucracy. Bureaucracy is, of course, the natural predator of innovation. It appears that too many U.S. companies have become quite innovative in inventing ways to use fees to bolster their bottom lines rather than seeking to pioneer a new product or process.

Finally, it appears that the United States, as a society, culture, and economy, suffers from having transitioned into a status quo mentality. The public debate is about preserving what we have or returning to core values. Having been a student of dozens of countries over the last 30

years, I believe I can detect the difference in the vocabulary and body language of a nation looking forward versus that of a nation looking to preserve what it has.

Let me share some concluding personal opinions that you may find negative or positive, depending upon your perspective.

Innovation is our economic strong suit, but it will not solve all of the U.S. economic problems. It can create many jobs, but we are undergoing a significant transition in labor markets and the nature of jobs. It will not cure our debt problem.

As we transition from the knowledge economy to the creative economy, we are shifting away from economic concepts that can be captured in nationalistic or mercantilist terms. The Chinese are issuing statements and doctrine that suggest they do not quite believe this. National boundaries not only are irrelevant to knowledge and creativity, they also are actually counterproductive. Innovation is becoming more collaborative. So what do the terms *economic security* and *national security* mean, then?

We are focusing on security and spending on military matters out of proportion to our economic capability and economic potential. The experts tell us that our spending on healthcare is similarly out of proportion. In his seminal book *The Rise and Fall of the Great Powers*, Paul Kennedy argued that such disproportionate spending is an indicator of a declining great power. There is presumably an optimum balance between wealth creation and military strength. Are we there yet?

The conditions I have described are not a platform for continued U.S. "dominance" of the world. We do not want to talk about it, but the U.S. economy will not support single great-power dominance once our economy represents only about 10 percent of the world economy, versus the 50 percent it represented after World War II.

I always want to tell young people just starting their careers that their greatest challenge will be to help the United States make the adjustment from great-power status to a more complex but (I believe) still quite comfortable relationship with many peers. Our choice is clear: either we can not talk about reality and continue patterns of deficit spending that will only hasten a messy denouement, or we can begin to make the intelligent choices today that will ensure we remain the most influential society in the world even as we relinquish the status of sole superpower.