

Innovation as a Key Driver of Economic Growth & Competitiveness

NIST nist.gov/speech-testimony/innovation-key-driver-economic-growth-competitiveness

20 June 2012

I'm going to just give you some final parting thoughts on why we're here, why we're talking about innovation.

One observation I'll make: there was a Wall Street Journal article that was put out last month that talked about innovation, and it made a couple of interesting comments. It said if you look at the Securities and Exchange Commission collection of annual and quarterly reports that are filed with that agency, just last year, the word "innovation" was mentioned 33,000 times. Now, that's a 64 percent increase over just five years ago.

If you ask executives whether they have a chief innovation officer, about four in 10 will now say they do. But what's really interesting is if you talk to them about why do you use the term, a common answer is "well everybody else does it."

I think one of the reasons that we're talking about innovation is that it is now sexy. This is something that everyone is excited about.

But I want to back up a little bit and from a very government-centric viewpoint, talk about why we're talking about innovation. And I'm going to be more specific—we're talking about technological innovation.

The reason we're focused on it, the reason the President, for me, did this rather startling thing of putting it at the centerpiece of our economic agenda, is because the truth of the matter is it has been the key driver to our economy.

Well over half of the economic growth in this country since the end of World War II has been directly attributable to technological innovation. It accounts for most of the positive difference in per capita income. It drives almost all of the growth in economic output and productivity. And it's really the key to competitiveness for almost every company that's there. If you look at how innovative companies are, you can directly correlate that with how competitive and successful they are.

So in the midst of one of the deepest recessions this country has had since the Great Depression, the reason we're talking about innovation is because it matters. It drives our economy.

The other problems, or a thought about innovation, is that we tend to talk about innovation in the context of its moving parts. We talk about research and development, the generation of new ideas, science, obviously a critical part. We talk about the role of the creative engines of innovation, the entrepreneurial community, the risk takers, the ones who have that vision and took a chance to make it happen.

Increasingly, we're talking about manufacturing, the producers, the ones who take those ideas to scale and generate the products and services in our economy.

It's actually an interesting development, as an aside, that the focus on manufacturing, from my perspective, was an inevitable consequence—I didn't foresee it coming—but it was an inevitable consequence of raising innovation as a centerpiece. And one of the reasons for that is that's where a lot of the innovation takes place.

You cannot escape the fact that the process of developing new technologies and new ideas is deeply entwined with the struggles of making it. And if you look at where scientists and engineers work in the private sector, they are mostly embedded in our manufacturing-based industries.

If you look at where patents come from, they're almost all from manufacturing-based industries. If you look at our balance of trade, a lot of it is being driven by manufacturing. So a lot of the action, where the participation by the broader public in an innovation economy takes place, is really in the production side.

And so it is evitable that we were going to be talking about it. It's refreshing. When I first came to Washington and started my career at NIST 19 years ago, we were not openly talking about manufacturing. It was not sexy. And so that's a refreshing change that we're talking about.

By the way, manufacturing has changed radically—something that we all have a job to talk about. There was a report the Commerce Department put out about a week and half ago talking about jobs in the manufacturing sector. Very interesting.

So there is a salary gap. The manufacturing sector on average earns about 8 percent more in salaries and wages over service-based industries. What's really interesting if you look at benefits, there's a 59 percent advantage in terms of health care benefits and retirement benefits for those who work in manufacturing-based companies over services—an enormous difference.

The other interesting thing is manufacturing jobs are becoming high-skill jobs. A couple of years ago, the fraction of the manufacturing workforce that had a college education or more exceeded those without for the first time in that sector. And it's grown 43 percent, the fraction of manufacturing workers with college degrees, 43 percent in the last decade alone. One in three of those jobs—those jobs requiring a college degree—require STEM education: science, technology, engineering, and math. I think that is something we need to help explain to the public, because I don't think that transformation that is happening in this country is well understood.

So we talk about innovation from the moving parts. We talk about talent, R&D capacity, translation, commercialization, entrepreneurship.

The government role in innovation is largely defined by traditional government roles. It's not that there is anything new to this. The government has always played a role in a lot of these moving parts. It plays a clear and obvious role in driving research and development, transformative changes in technology that are essential to our national security and other critical national needs. Its role in promoting effective infrastructure, whether that's physical infrastructure or transportation infrastructure, cyber infrastructure, energy infrastructure. Promoting trade. Nurturing the tax and business environment that's conducive to the risk taking, the entrepreneurial risk and growth that we want to see happening. And supporting small businesses. These are all traditional roles, long-term roles.

So the thought I wanted to leave you with: by the President putting innovation as the centerpiece of his economic agenda, what it has forced us to do is realize that innovation cannot be solved by looking at each of the individual moving parts.

Innovation is about a chain of performance, and that chain is only as strong as the weakest link. And so we have to get it all right.

We're going to have to worry about R&D and the level of investment that we make as a country in research and development. We have to worry about the translation of science and know how with the commercial sector and protecting intellectual property and nurturing entrepreneurs. We're going to have to worry about the problem of scale up in manufacturing and production because it feeds back into research and development. We have to worry about the markets. This is a global market, we live planet wide, and these things all have to work.

And that is going to present enormous challenges to every single federal agency that has one of these individual critical roles. We can't look at it in a component fashion.

It is also true that you can't simply stop with the public sector. One of the interesting challenges that has come up immediately: it is very clear to the manufacturing sector that the federal government's footprint in this space is limited.

Manufacturing—all the action is in the private sector. And the states are playing enormous roles, too, through their economic development activities, through their institutions of higher education, through the focus that regions have and their comparative advantages. And the only way, again, that this works is putting all of those pieces together.

So, innovation has been remarkable. I think it is central to our nation's future. It's deeply gratifying that it has received this central place, I believe a rightful central place, in our discussion. But I also want to point out that it's a disruptive policy. It's going to force us to work together in ways that we have not had to work together before. And I think that the response to that has been heartening. I would say the agencies in the federal government work as closely together in looking at innovation-related activities as I have seen in my 20 years in the federal government.

And the focus on the federal government being a good partner with the private sector is as strong as I've seen in that time. It is changing the way I look at my own agency at NIST, in terms of how we move towards supporting industry and standards, in terms of how we work to support other federal agencies in supporting this enterprise.

And the last thought I'll give you is that not only does everything have to work together, but we have to do it over a sustained period of time. The time frames that you saw in that video over which the disruptive ideas take hold and transform our society are often faster than we expect, but they're often not as fast as you hope. And so we have to not only pull together a wide variety of partnering parties to work together in concert—different agencies within the federal government, the federal government with the states, the states and the whole public sector with the private sector—but we're going to have to find a way to make more right decisions than wrong decisions over a sustained period of time. And that's going to require a consensus about the right things to do at a time when sometimes consensus is a hard to find.

We'll hold that in front of the challenge for this group for us to all work on together, and let me end with that and thank you for the opportunity to be here today.

Manufacturing