

## **Video Transcript for “Japan and Silicon Valley: Origins, Trajectories, and Implications”**

Online at <http://spice.fsi.stanford.edu/multimedia/japan-and-silicon-valley-origins-trajectories-and-implications>

### **Kenji Kushida**

Research Associate, Japan Program, Shorenstein Asia-Pacific Research Center

\*\*\*\*\*

Silicon Valley and Japan are essentially two very different but incredibly important areas of economic innovation. They produce all sorts of products and services and they have very interesting histories that have really altered the course of the world, but they've approached this basically from opposite ends.

So, Japan's innovation comes mostly from its background as a rapid industrializing country, starting in the late 1800s and then the post-war period. And now we think of industries such as automobiles, precision tools and things, and those are Japan's strengths, and originally it was more in heavy industries and places like that.

And Silicon Valley is newer, much newer, mostly in the post-war era, and historical innovation from semiconductors and then software, and more recently things like Apple, your iPhone, Google for search and web services, and Facebook for social networking, and Tesla for electric vehicles. So this is the Silicon Valley side. And right now, really in most of the world, Silicon Valley is considered as the world's center of innovation in areas related to information technology, IT. But as IT is now increasingly in basically everything, and it will expand into other areas, the reach of Silicon Valley innovation is going to hit all sorts of walks of our life. And in Silicon Valley and Japan terms, they have a history of competition, and now we're moving towards working together.

In many ways, in the following sense, they've started as the opposite model. Silicon Valley is a business ecosystem of high-growth startup firms—business models and technologies that disrupt existing firms and industries. The disruptions and the innovation are more radical, they break apart existing firms, they transform how we think about many things. It's an exception to the U.S. model, pretty much, and it's the center of current U.S. innovation and growth.

And Japan is traditionally a large firm centered economic model. They've got big companies that have a variety of activities that employ people for a long time and the innovations are slower, and they're incremental, but they're for bigger things. So, if you think about how complicated an automobile is, it has let's say about 30,000 parts, each of those parts goes through years and years of improvements and it's this kind of complex

product that have nonstandard interfaces that a big Japanese firm like Toyota that works with thousands of suppliers, works over years to make better and better which is a very different development paradigm from, let's say, Google, where they come up with all sorts of interesting software and services that they test out in different areas and if it doesn't work, they pull back and they try radical new things. And just a couple of years ago, they announced, okay, well we're going to actually try to make autonomous driving vehicles that will drive themselves, and they started the project very quietly but they're interested mostly in the software development area.

Historically, around the 1980s, following the 1970s oil shocks, the U.S. was actually overall in a pretty big recession. There was inflation, unemployment went up, and U.S. manufacturing took a big hit. Factories were closing, people were demonstrating, and it was just at this time by the time the 1980s hit, that there was a surge of Japanese manufacturing firms that came in. This was the first surge of Japanese autos like Toyota and Nissan and these folks. The Japanese surge into global markets, this included Silicon Valley. So Silicon Valley which—maybe there's a map available—but basically Silicon Valley is the area south of San Francisco Airport including the area of Stanford and then down into San Jose. These days it's expanded up into San Francisco as well, that we call the Silicon Valley economic ecosystem is basically the San Francisco Bay Area. There were a lot of factories in this area. A lot of them were semiconductors and other types of factories. These got largely decimated by Japanese firms that came in in the 1980s: NEC, Fujitsu, these firms made semiconductors, they were very good at it. But then Silicon Valley firms that could not adjust, they all basically died. The ones that could adjust moved towards high-value things like design, and designed here and then manufactured elsewhere like using Taiwanese firms in China, et cetera. So if you think of a current Apple product, it's designed in Cupertino which is in Silicon Valley, manufactured in China. So, this was a paradigm to combat and to overtake the Japanese model that came as a surge of high quality manufacturing products.

So then we got into this adjustment where large U.S. firms until then used to look a lot like current big Japanese firms: they had long-term employment, things like IBM called the IBM way, you know, pretty much once you join IBM, you're there for the rest of your career, the HP way, Hewlett-Packard way, similar arrangement. They were very stable, long-term companies that worked with their in-house research and development and they moved along predictable technological trajectories. But then after this massive difficulty in the '70s and then really in the 1980s, these firms had adjusted, moved towards a model of open innovation where they got products and services from outside the company. They also did away with their long-term employment, so people who used to be expected to be there forever were basically thrown out. IBM famously cut almost 40 percent of its workforce and then all these—a lot of these people were very skilled people who had interpersonal networks and deep knowledge of various areas—they were thrown out of the companies. This provided a workforce for entrepreneurs in

Silicon Valley, who then built this whole ecosystem of high growth startups, this was a workforce for them.

So then, now, if you look at what we have, is we have a situation where from the 1990s to the late 2000s, there was a U.S. resurgence centered around the computer industry where large firms did regain competitiveness at the same time lots and lots of new firms emerged. A lot of new firms were bought by large firms and a lot of large firm people left the large firms to make new companies. And what we see at the same time in the 1990s, Japan's asset bubble burst in 1990 and 1991. So then just as the U.S. and Silicon Valley was shifting the way that they compete against Japan, Japan was losing some of its extra cash that was created through the asset bubble and then they were confronted with a big competitive threat. So instead of making things and the value being in being able to make something well, it was in designing something well and then allowing somebody else to make it at a low cost. So then the Japanese model had a lot of difficulty competing against and adjusting to this. And that's pretty much where we are now with firms like Intel. For a long time if you had a computer, you didn't really care who made the computer. It was important that it ran Microsoft operating system and Intel processor, "Intel inside." And then Google, Facebook, Cisco, Oracle, these firms emerged from Silicon Valley.

Overall, we now have very contrasting models that were initially fairly similar but then Japan outcompeted Silicon Valley and lots of the U.S., then the U.S. adjusted, and then now it's Japan's turn to slowly adjust to try to figure out how to harness Silicon Valley. So as I mentioned, initially Japanese firms came in as competitors and now there are all sorts of efforts to figure out how to make use of the innovation engine that is Silicon Valley through open innovation. So how do we get a lot of the innovations that occur here and bring them into the large Japanese companies? How do you take the resources that large Japanese companies have and bring them to Silicon Valley that will benefit people here but also benefit the Japanese companies?

So there's some really exciting developments recently, such as Yamaha Motors that's famous from its motorcycles and other engines for boats and things like that. In 10 months, they made a humanoid robot that drives a motorcycle. It's fully automated so the thing revs up. And there are advantages that if you're going to buy an automated car, you have to buy a new car that's automated. There's AI [artificial intelligence] in there. But most things you might not want to re-buy. What if you just have a robot that will drive your car for you? And the human interface is important because there's a steering wheel and the pedals. Well, actually a lot of things are human interfaced, your lawnmower, aircraft, all sorts of things. So why not just make a robot that's good at that one thing? That's what the people at Yamaha Motors thought when they established the Silicon Valley branch. So, a radical idea like this at home [in Japan] was met with sort of laughter—"Oh, we can't do this kind of thing." But then they said, "Well, watch us," and they were able to secure funding beforehand and said that we're pretty much

autonomous use of this fund. And they partnered with SRI, which used to be Stanford Research Institute, that has a lot of robotics and artificial intelligence engineers and scientists there and they made the thing in 10 months at a very low budget. And that's partly because a lot of the Silicon Valley researchers didn't have other big companies that were going to make something based on their research. And Yamaha came in and when they decided to do this, they came up with something that was about 90 kilos heavy. But then through the Yamaha manufacturing expertise, they were able to cut the weight in half. So, there's a lot that the manufacturing expertise can still give to Silicon Valley, and some of the potential here to create the new algorithms for artificial intelligence, the robotics, et cetera.

And so another firm, for example, Komatsu that makes large equipment for mining and construction sites, big diggers and very big bulldozers and dump trucks. So, they've actually been doing fully automated dump trucks for large mining operations since 2008. And so nobody needs to ride them, it's terrible working conditions, it's hot, it's dangerous, but they've been able to automate that. And now they're working on construction equipment where they take drones to map out the topography of the construction site and then do all the background calculations to figure out, well, if you're in a big hurry, we need this much equipment and it will take you this long. If you're in less of a hurry, you need less equipment and more time. And this is all based on information that they gather from, say, drones. They don't make drones themselves. They came to Silicon Valley and found a couple of companies that make drones and then made deals with them and acquired other companies that make sensors, et cetera, to bring it into their core expertise of this.

So, the way they approach artificial intelligence, for example, is that you can also augment people. Very difficult construction equipment, moves that take let's say 10 years of experience, they're able to do it by building intelligence into the machine, somebody that has very little experience, maybe a year or so, can do these very difficult operations. And so, in order to do that kind of thing, they send in researchers into top universities like Stanford and U.C. Berkeley to study artificial intelligence but they also bring their own expertise in the manufacturing know-how and the workflow knowledge. And so right now, what they're doing is to make an open platform, not operated by them, owning and not without their name on it, they'll be completely open to connect all equipment in any construction site anywhere. And their strategy is well, if you can connect all the devices because sensors are becoming cheaper, information processing will be cheaper. If you connect all these devices, then everything will become much easier, much lower cost and by the way our machines are very good at making use of this but they don't need to go take all the information for themselves or brand their platform. And where do you make an open platform like this? Well, Silicon Valley. This is a place for a lot of that happens.

So, in this kind of way, we also have Silicon Valley startups that see a very large market in Japan. And Japan is also a place where services can be improved significantly. So Google has major research and development operations in Japan and some of the services that they created like people finder so after a natural disaster, people can check in and you can check in who's checked in so you can figure out if your family or friends are okay after a natural disaster. Some of this was made in direct response of the March 11, 2011 Great Tohoku Earthquake and tsunami disaster. And Apple, two years ago, just created—one to two years ago, just created a major research and development center in Japan to use their high-end R&D personnel to create their next generation products. And say the note-taking service Evernote they found their first big consumer base in Japan when they partnered with the big Japanese company. So, from the Silicon Valley vantage, Japanese firms bring interesting manufacturing and technologies here and they bring in a big potential market for firms from here that want to go there. So that's sort of the brief overview of the history of Silicon Valley and Japan and a trajectory of where they're going.