

The Place of a Research University Within an Innovation Ecosystem

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Good morning.

In this weekend's Pujiang Innovation Forum, we are discussing the different elements of an innovation ecosystem. This is a very broad and exciting topic, one that touches on every aspect of economic society. I would like to contribute to this discussion by speaking about one corner of this ecosystem: the research university.

Over the past twenty-five years, I have lived and worked within four different research universities – the University of Michigan, Cornell University, Peking University, and New York University. My experiences within those universities have led me to believe that research universities can make crucial contributions to innovation ecosystems.

I will focus my remarks this morning on how research universities can contribute most effectively to economic innovation. I will suggest that research universities should be understood to be a vital part of the creative landscape. Specifically, research universities can shape the creative landscape if they do two things – if they become true centers of intellectual stimulation that attract talented faculty and students, and if they teach in ways that help students to develop their creativity.

I will begin by discussing four writers who have helped us to understand innovation, its importance, and the mechanisms by which it takes place. These four writers are Joseph Schumpeter, Peter Drucker, Clayton Christensen, and Luke Williams.

In the first half of the twentieth century, Joseph Schumpeter argued that economics needed to shift its focus. He believed that it was a mistake to focus on the idea of an equilibrium – the stable outcome of competition among suppliers of labor, competition among suppliers of capital, and competition among producers of goods and services. He insisted that economic theory should be more focused on entrepreneurial innovation. New products, new technologies, new sources of supply, and new kinds of organization are forces that constantly revolutionize the economic structure from within, through a process he called “creative destruction.”

Whereas Joseph Schumpeter wrote as an economist, Peter Drucker wrote with a different voice. A professor at New York University for more than twenty years, he wrote from the perspective of a business leader. Drucker argued that innovation does not come about only as a matter of good luck. Innovation is something that you can learn to do, through careful analysis and hard work. He argued that you can innovate successfully if you focus on what is happening around you. Within your business environment, look for unexpected successes and failures, look for incongruities, look for process needs, and look for industry and market changes. Within the larger society, look for demographic changes, changes in perception, and new knowledge. When you find those things, think about how a small, simple change might have a big impact on the market, and think about how to manage the risks that come from making that change.

Clay Christensen carefully studied a particular kind of innovation – the innovation through which a dominant company is surpassed by a newcomer. The common pattern that he found was that the old company focused on improving what they were already doing, in ways that their typical consumers valued. The new company introduced what he calls a “disruptive technology” – a way of doing things that is actually worse than the old way in some ways, but better in others – usually by being simpler and less expensive. Gradually the new company would improve the new technology so that it became “good enough” in all ways that really matter, including the ways the old technology was better, while still keeping its new advantages. In later work Christensen studied how peo-

ple came up with these disruptive technologies. They all tended to ask lots of questions. In addition, some were excellent at studying their environment closely and critically, others spent a lot of time interacting with a wide variety of people, and others spent a lot of time just experimenting. However they worked, these innovators were exposed to ideas from lots of different people that others thought were unrelated. And the key innovation came when they connected up these seemingly unrelated ideas – when they saw an association among them.

Luke Williams has followed up on Christensen's insight and created a process through which people can generate disruptive innovations. Like Peter Drucker before him, Professor Williams is a professor at New York University. His process unfolds in a natural sequence of steps. People first learn how to develop an innovative hypothesis about the world. Next they learn how to turn that hypothesis into a real-world business opportunity. They then learn how to create a disruptive idea that seizes that opportunity. They learn how to make that disruptive idea practical. And they learn how to persuade others to embrace it.

When we consider the writings of Schumpeter, Drucker, Christensen, and Williams, we see that the innovation ecosystem is an ecosystem of constant and rapid change. In the foreground of that ecosystem, actors are constantly appearing and disappearing, quickly becoming strong and quickly being replaced by new, even stronger actors. My point this morning is that a research university can be a key element of the innovation ecosystem by shaping the background, the creative landscape. It can do this by gathering a pool of exceptional researchers, drawing talented students into a highly stimulating environment, and then teaching in ways that develop the creativity of those students.

As its name indicates, a research university engages in research. But research universities are not the only institutions that engage in research. Businesses engage in research. Nonprofit organizations engage in research. Governments engage in research. And private individuals engage in research.

So what is so special about the research done at a research university?

In my experience, universities have been most successful when they concentrate on doing research that others – especially businesses – are not doing. This is not research aimed at designing a particular product for sale. It is instead research aimed at creating a more general public benefit.

One kind of research that fits in this category is called “fundamental research” – research that focuses on developing and testing theories about how the world works. The goal of fundamental research is understanding.

Another kind of research in this category is called “applied research.” Applied research is intended to help solve real problems in the real world. But it is important to recognize that there are different kinds of applied research, and universities make their biggest contributions when they focus on one kind and not another. The best applied research in a university supports industrial research, and does not replace it. This kind of applied research meets two tests of research significance:

First, it is original – it involves more than simply following someone else’s instructions, and it must also tell us something that we really did not know before the research was carried out. Second, it has broad implications – it is useful for many different things; in other words, it shines a light into a large area of darkness, rather than into a very small corner.

I should say that some people believe this emphasis by research universities on fundamental research and significant applied research is a mistake. Some people believe that most of a university’s research capacity should be used to create business innovation directly – to create new products that will have an immediate impact on society. In the United States, these are people who have urged universities to increase dramatically the amount of energy they devote to “technology transfer” and to “business incubation.”

While a limited amount of this work can be valuable, it should not dominate research at a university. In my experience it can usually be done just as well, and often better, in the context of business enterprises. It is much better for research universities to focus on doing the things that no other institutions can do as well.

My main point this morning is that research universities are essential parts of the innovation ecosystem even though their main work is something other than producing new products or incubating new businesses. The professors who do fundamental research and significant applied research create a tremendously stimulating intellectual environment – for one another and for their students.

Innovation is promoted by environments that are complex rather than simple, heterogeneous rather than homogeneous. Such environments stimulate our brains, encouraging them to see linkages and associations between areas that might ordinarily be thought unrelated. Modern research universities attempt to create environments where people first devote themselves to acquiring deep mastery of a particular discipline and then cooperate with people who have mastered other disciplines to expand the kinds of insights they can produce. One cannot be great at interdisciplinary work without first devoting years to becoming a true expert in one field – that is why these fields are called “disciplines.” But today much of the most exciting research is being done by interdisciplinary teams.

The second feature of a research university’s contribution to the innovation ecosystem is its ability to attract talented students. For hundreds of years, the very best students have left their homes to go study at universities where they could be near great researchers and scholars. And once a university becomes known for having great students, that process builds upon itself. The best students want not only to be near great professors; they also want to be around other outstanding students, because that will make their environment even more intellectually stimulating.

To make the greatest contributions to an innovation ecosystem, however, I believe that research universities have to do more than just gather talented professors and students together in one place. I think it is not enough for the university to assemble the people together and then watch to see what happens.

A research university has to take teaching very seriously. It needs to understand what qualities its students must develop if they are to be the disruptive innovators of their generation. And it needs to design its cur-

riculum and its methods of teaching to help students develop those qualities.

Permit me to focus on just one of those qualities right now – the quality of creativity. Creativity means the ability to produce something that is new and that is valuable. An enormous amount of research has been done about aspects of creativity. For example, scholars have studied how some people have the habit of producing many different answers to a question – a quality that is called “divergent thinking.” Others have studied how some people have the habit of imagining a world that is different from the one we observe – a quality that is called “counterfactual thinking.”

My own observations of creativity tell me that, in most social situations, the artist Henri Matisse was correct when he said, “creativity takes courage.” Our emotions tell us that we are safer if we follow a precedent, if we repeat what someone else has said, if we apply an existing tool to our situation. To offer up something new, something fresh, is to risk embarrassment – even humiliation. It requires us to accept the risk that what we suggest might be proven incorrect – even silly.

As a matter of basic education, most societies teach their children not to be creative in this way. We are taught to be “passive learners” – to follow our parents and our teachers, and to repeat what they have told us. When we are given a problem, we are told that we should solve it with a tool that someone else has given us.

To be a creative, innovative adult, however, we have to grow beyond this way of thinking. We have to acquire the courage to be creative. We have to learn that we can take chances – putting forward new ideas that are probably wrong, in hopes that we might eventually put forward a new idea that is right.

A great research university knows how to develop this courage, how to develop this creativity, in its students. It does this by shifting away from a model of “passive learning,” in which students receive information and wisdom from their teachers, to a model of “active learning,” in which students practice the skill of going out and discovering the world, with wise teachers as their guides. In this kind of environment,

students are not rewarded for saying things that are new but wrong, but they are not heavily punished for doing that either. And they do not get much credit for repeating what someone else has said. The big rewards go to students who have new, valuable ideas – original and helpful ways of thinking about a problem.

Talented students who learn in this way are in very high demand after they graduate. Indeed, businesses that need creative talent often locate themselves next to research universities. They want to have these students as interns while they are still students. And they want to be able to hire these students as employees as soon as they finish their studies.

Once some of these entrepreneurial companies start to locate themselves next to these universities, others will locate themselves there as well. They will feel more creative, more innovative, if their environment includes the stimulation of other entrepreneurs. And once a critical mass of entrepreneurs are there, other supportive workers will join in as well – venture capitalists, technologists, lawyers and accountants.

In the past I have called this development a “talent snowball” – after a critical mass of talent has been found in one place, more and more talent wants to pack in nearby. But I must say I prefer the image of today’s forum – an “innovation ecosystem.” A healthy innovation ecosystem involves a constant interaction between actors in the foreground, and a background landscape. By making that background landscape a resource for creativity, a research university can be a tremendous catalyst for innovation.

As you all know, next fall we will be opening our doors at NYU Shanghai. We will be attracting the most talented researchers and the most talented students from all over the world. And we will be showing our students how to be active learners. We very much want to be a useful catalyst within the extraordinary innovation ecosystem that is Shanghai.