

Innovation System: the Problem is to Get the Process Started



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Professor Kregel, to your mind, what are the latest changes to innovation policy in the world? What do think about the given changes?

If you look, basically, what we've seen is a very large shift in what we would call the innovation paradigm, the general approach to innovation. So, if you can divide into very broad categories, and say that we shifted from a mass production paradigm, the one that is based primarily on capitalist production and economy of scale, to one that has moved into more specific production and what we call the idea of economy of scope. In general, this is blink to micro processors, and the use of computer technology, communications and the things of this sort.

The first, I think, important change that has brought this shift in innovation paradigm was a simple possibility of a geographical dispersion of production. It means that you can access lower costs in specific markets. If you had a particular type of production, say, for example, you are producing an automobile, you produce an engine in Indonesia because the wage costs in Indonesia are much lower than they would have been producing in a European country.

So you have dual impact. The idea of using computer technology and micro processing had an impact on the production process, and also you have this impact on other costs of production, and, in particular, labor costs that you can generate by moving the particular parts of the production process to different countries. And this you clearly never would have done with the old fashion. By old fashion I mean the first process we talked about, which was mass production because all of this, by definition, had to

take place in one particular place, in a very large producing unit. I think this is the most recent change.

Now, obviously, we've seen over the last 10 or 15 years a big process of globalization which has been basically driven by a kind of technological innovations. The question is what is the next innovation wave? A number of people have looked at things like nanotechnology and biotechnology. But there is another side area which is environmental. So, if you look we have a big oil spill that is taking place in the Gulf of Mexico, and the kinds of technology that you can see that has been used there are in fact a sort of that mass production technology still. So, in terms of energy production what I think we going to see is a large amount of accusation of things like biotechnology.

What do you think about changes to governments' innovation policy? Are there any changes in what governments do about it?

If you look at the US government – US government has always had a very strong technology policy, and this has always been the national defense. If you look at some of the innovations that we've talked about – the micro processors, micro technology, things like the Internet, the Internet was originally generated by the US defense department in order to ensure safe and secure method of communication in case of national emergency or national disaster. This was something that was clearly generated as a part of research and development that was initiated by the government through the defense department. Much of this currently has changed. Let's take the example of Internet. When the Internet was developed it was not thought about as a commercial process, and the government really took no steps to ensure that it could be used as something that could provide a commercial basis. The only thing they were interested in is whether or not the militaries and the government could communicate among each other. They never thought that the Internet would be something that you and I would use in terms of daily activity, or that it would be a commercial process. So this was something that was developed more or less spontaneously by the market.

Currently, the government has support for research and development which is undertaken in a more balanced way. That is what would happen is that they would put out a tender or if you like call a contest for a particular product which they would like to develop. And then the individual companies would compete, will offer different solutions to that contest. But when the government finds the one that they decide is the most efficient it then also attempts to provide the company with a possibility for a company of using it for commercial purposes. That is to build it as a viable commercial entity.

Now, in one way, the government is providing this because once a company wins a contest, obviously, the government is going to buy its product. So, it provides it with a market. But, at the same time, it also gives to the company supports in terms of trying to develop a commercial market for that product. Say, for example, the defense department asks for some piece of equipment that is supposed to be used only on some sort of secret airplane. Obviously, the company can't sell that product to the market because nobody else could use it. So what they do is to help the company elaborate the product so that it could be used in some way that it could be sold in the commercial market.

Instead of just supporting research and development of a product they also support the ability of the inventor of a product to form a company. So, again, let's just take an example – Microsoft. Say, Microsoft had developed

its operating software just for the government. The government then would buy your software but at the same time will help you to form a company so that you can sell your software to the general public.

What about the market environment in general? I mean, another role that government plays is that it creates an environment where new companies, so-called start – ups, can easily operate. To your mind, what a government is to do in order to create an innovation - friendly environment?

Well, as I have already mentioned, first thing is in providing market for products. It is very important. The second thing which has been very useful, in particular in the US, is industrial parks. What we call cluster into a particular area. Now, this is a very long tradition that talks about industrial district or industrial zones. And the fact that you create very large externalities by allowing firms

things like that.

Another very important thing is coordination of financing, and what we call a permission of venture capital. There is something the government can't support by means of setting up ventures. For example, in the US we have government sets up its own venture capital funds. It provides financing for new innovation and new technologies that they are particularly interested in.

You have to do all these three components: you have to have a possibility to create new companies and implement and sell products on the commercial basis; research and development in the industrial parks and innovation centers in order to produce the technology; and you also have to have financing or venture capital financing.

One of the difficulties is simply getting all this process started. Most of the new start – ups are in fact financed by already existing companies. So, if you take a big company, like Intel or

can use. So, you get this process of inner venture capital funds which are set up. And many times this is what we call vendor financing.

For example, Cisco produces routers. Now, there is maybe a company producing a completely different product but requires the output one of the routers that Cisco produces. So Cisco will sell them the product that they can use in innovation process but they won't charge them for it. That is they will not make them pay. They will say: "OK, we will lend you the money to buy our equipment, so that you could develop a new product. And then, if you are successful, you can always pay us back in terms of shares in your company or in terms of profitability". So this process of internal financing within a sector which comes as innovation process becomes mature. But, as I said, this is something that comes as a secondary stage. The problem is always to get it started.

Do governments always understand their role in innovation process? What government innovation policies are you familiar with?

In general, the governments don't pay enough attention to innovation policy. In general, as I've already mentioned in the US it is primarily a defense – driven process. And the idea is basically that the private market should be capable of doing this by itself.

You do have very strong policies. For example, the Chinese government has a very strong policy in terms of using foreign direct investments, and joint ventures in terms of generating technology.

The Japanese government in difference had a policy of buying technology from the outside and then developing it internally. This is a different sort of process, the one that comes from a country which is in process of catching-up. After the war Japan was in a position in which industry was totally destroyed. So they had to start from scratch. What they did is that they went and bought technologies primarily from Europe and from the US. And then they set up a process of internal elaboration of those technologies.

So, basically, the difference in terms of governmental policies, say, between Japan, China and the US is that the US already being an advanced country faced a very different innovation problem than was faced by Japanese government. Korean government had a very

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that are working in a particular area be concentrated so that there is a dissemination of information and other stuff.

You always have to keep in mind that there is a very strong linkage between the innovation side that is part of research and development process and the idea of implementation and commercialization. And if you can't manage to generate a demand for the product and efficient sales for the product then the entire process brakes down. It is impossible to have just research and development just for the sake of innovation. You have to be able to implement and install the technology, and for this you are required a strong support of commercial sector. This is one of the reasons why, for example, defense department pays much more attention to the formation of successful commercial ventures supporting the research that they are interested in. And this is also something that you find by setting what you call industrial districts or innovation centers or

Sysco, Intel and Sysco have their own venture capital fund. They simply finance new companies, and try to develop new products. Once the process gets started, it is much easier to proceed. The problem is to get this process started, and it is when the government plays a very important role in providing both the possibility of creating the industrial parks and providing the kinds of venture capital funds.

So, at some point innovation system becomes self-sufficient. In other words, it reproduces itself. But still, we cannot do without government in order to create a well functioning innovation system?

That's right. The idea is to get the whole process to get started. Once it gets started, then you get this sort of self generated production. In general, we see in the US this sort of large and successful companies. You start up with a particular kind of innovation, and the companies that are interested in finding other innovations which they

similar proposition. That is, Korean government bought technologies and then developed them internally.

This is, more or less, a decision of a country whether you are supporting what is called basic research or whether you are simply taking existing technology, trying to elaborate those technologies so that you build up domestic competent.

And one of the difficulties here is that, if you are already in advanced country, obviously, you have trained personnel that are able to work in this sector. Whereas, if you are in a country which is catching up, you need your own human capital base in order to provide a possibility for setting up your own technological development.

Some countries succeed more in innovation, some less. Why some governments manage to build more efficient innovation systems comparing to other countries?

Basically, I think important aspect we found is whether or not the government policy very strong supports domestic expansion and domestic employment. Because the more successful the economy is, if growing and using its domestic resources, generally, we find the more successful it is in providing innovation. Countries that have very low growth rates and have high level of unemployment then, in general, they do not have the resources to devote to innovation strategies. On the other hand, the economies that are attempting using policies to grow very rapidly and to provide full utilization of the resources are the ones that do in fact end up with successful policies. I think it is a question that cannot be separated from overall approach to economic policy. Economies that have been successful in innovation have also been the economies that have been successful in their industrial development and using economic policy type to produce reasonably high growth rates and reasonably high levels of employment.

What research and development may assure technological breakthrough in the nearest future? Do you think that such a breakthrough will happen?

As I have already mentioned, a lot of people believe that nanotechnology, the idea of this little micro engines is going to be the next level. So, if you look at these sorts of innovations, and you ask what areas it is going to be, I would say, nanotechnologies will serve, for example, in area of health service. They have not yet been export,

but they could be extremely important. That is, for example, in development of medication which, in fact, can be used for targeting implementation. So, instead of taking a pill which goes into your body and goes all over your body in order to produce a very precise impact in only one section, you now can take a little nano – whatever it is – and you ingest it, and it goes directly to the place where the medicine has to be delivered.

So, things like this, that are not being developed, have a possibility of changing quite dramatically the way we look at things like healthcare. Again, you have to separate the innovation from the implementation. A lots of innovation that come along are very interesting but may be they do, maybe they do not end up providing any sort of implementation that can be commercialized. In this case, let's say, if you look at nanotechnology and biotechnology – they set pretty clear impacts on sectors which are crucially important, like healthcare. For example, in the US our healthcare costs are extremely high, and they do create difficulties in terms of overall economic development of the system. So, if you manage to produce an innovation which can be used in order to bring down healthcare costs dramatically, then this sets a very big impact on the economy not so much as a result of the innovation but as a result of the way the innovation is implemented in the system.

INNONEWS

Dmitry Medvedev confirmed the composition of Scientific Advisory Board of a nonprofit organization "Foundation for the Development of the Center of Development and Commercialization of High Technologies".

The Board includes well-known Russian and foreign scientists.

Zhores I. Alferov – Vice-President of the Russian Academy of Science (Co-Chairman of the Board)

Roger Kornberg – Professor at Stanford University, USA (Co-Chairman of the Board)

Vladimir B. Betelin – Director of the Institute of System Research, Russian Academy of Science

Evgeny P. Velikhov - President of the Kurchatov Institute

Yuri V. Gulliaev - Director of the Institute of Radio-engineering and Electronics, Russian Academy of Science

Eugene V. Kaspersky – Founder of Kaspersky Lab

Vladimir V. Kozlov - Vice-President of the Russian Academy of Science

Gennady J. Krasnikov – Chief Executive Officer of Scientific Research Institute of Molecular Electronics and Plant «Micron»

Yuri V. Natochin - Head of Laboratory at the Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Science

Vladislav J. Panchenko – Head of the Russian Foundation for Basic Research

Valentin N. Parmon – Director of Boreskov Institute of Catalysis SB RAS

Igor B. Fedorov – President of the Bauman Moscow State Technical University

Vladimir E. Fortov – Director of the Institute of Extremal States Thermophysics, Scientific Association for High Temperatures, Russian Academy of Sciences

Valery A. Chereshnev - Head of the State Duma Committee for Science and High Technology

Mikhail V. Dubina - Head of Laboratory at the Nanotechnology Research and Education Centre, Russian Academy of Sciences

Vladimir V. Okrepilov - Director of Testing and Certification Centre "Test-Saint-Petersburg"

Dieter Bimberg - Executive Director of the Solid State Physics Institute at the Technical University of Berlin

Arden Bement - Director of the Institute at the Purdue University (USA)

Detlev Ganten - Chairman of the Joint Council of Max Planck Institute of Colloids and Interfaces and Max Planck Institute of Molecular Plant Physiology (Germany)

Valentin P. Gapontsev - Chief Executive Officer of IPG Photonics Corporation (Germany)

Siegfried Dais - Deputy Chairman of the Board of Management, Robert Bosch GmbH (Germany)

Richard Lerner - President of the Scripps Research Institute (USA)

Philip Frost - Vice President of Oncology Research (USA)

Alan Heeger – Professor at the University of California, Santa Barbara (USA)

Vladimir M. Shalaev – Professor at the Purdue University (USA)

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