

## Executive Briefing

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### Gene patenting in the life sciences industry: Boon or bane?

FROM KNOWLEDGE@SMU

*Does gene patenting encourage or hinder knowledge diffusion and take up in the life sciences industry? Research by Singapore Management University management professor Kenneth Huang, and Massachusetts Institute of Technology management professor Fiona Murray found that patenting can have a negative impact on scientific progress. Specifically, the negative impact is greater when there is an increase in patent scope, patent thicket and ownership fragmentation. In addition, the negative impact also rises when patents are owned by the private sector and have immediate commercial usefulness.*



*Huang presented his and Murray's research findings at the at the Fourth International Research Conference on Asian Business organised by the Singapore Management University's Lee Kong Chian School of Business and the Wee Kim Wee Centre in March 2008. Referring to the life sciences industry in Singapore, Huang said that the government has been actively developing the biomedical sciences sector — comprising pharmaceuticals, biotechnology, medical technology and healthcare services — to become key drivers of the country's knowledge-based economy. For these research-intensive industries, patents and intellectual property rights are the core assets of companies and institutions.*

*Huang spoke to [Knowledge@SMU](mailto:Knowledge@SMU) about the implications of his research findings in the Singapore context.*

**Knowledge@SMU:** How does patenting hinder knowledge diffusion and innovation?

**Huang:** We live in a knowledge-based economy so intellectual property rights are especially critical to several industries, especially in the biotechnology and life sciences. This notion has been supported by scholarly research. Many companies in these industries got started because of a few key patents. The conventional thinking for many people, in Singapore and the US, is to encourage patenting, licensing and commercialisation. Patenting can be good but, at the same time, I think it is important to be aware of any negative or adverse effects of too many overlapping patents; for example when there are multiple patents on a piece of knowledge, you can imagine these patents as thickets or fences around it. While you can still have access to that knowledge, you need to license and pay royalties to each of the companies associated with the patents on this piece of knowledge. This will result in high transaction costs due to patent thicket. This is known as the 'anti-commons effect'.

If I'm a researcher working on breast cancer genes (I think there are about 14 patents on the gene), I will have to talk to all these companies and institutions, negotiate licences, and navigate through the patent thicket. Eventually, if I don't give up due to frustration and still have enough money to pay all of them or have resources to negotiate, then I can get to use it [knowledge]. If not, I will choose to switch my line of research to something sub-optimal, and this will be detrimental to follow-on research and innovation and to society as a whole.

**Knowledge@SMU:** What are the implications for Singapore?

**Huang:** In general, in Singapore the government as well as universities have this mindset that if they discover something they must try to patent it to get the most out of the invention. If they patent it, it must yield returns down the road and will translate into some commercial value at the end of the day. I'm not saying that a patent is not good as this represents the work of some scientists over a life time. You need to give them some financial incentives, and provide a mechanism for disclosure of inventions. At the same time, our research shows that there are some trade-offs. When you have too many overlapping patents surrounding a piece of knowledge, it is not necessarily good. It will affect how people use or access information, and subsequently affect the availability of follow-on research and innovation in critical areas such as healthcare and the study of diseases like HIV and cancer.

But there are things we could do to mitigate these potential negative effects, such as reconsidering the practices and policies with regard to licensing requirements, or changing or modifying the criteria for patenting to restrict the scope or to raise the bar for usefulness. In the IT industry, there is increasingly an open source movement. Some simple examples are: Wikipedia, which we can readily refer to and edit online; Linux, the open source operating system; and collaborative open source software development like Apache, where people can readily contribute and build upon previous knowledge with little or no restriction of intellectual property rights. This movement is not as common with the life sciences. I'm not saying that everyone should give up their patents but there is a trade-off. We need to balance the obsession with patents with how that might impact follow-on research and innovation in critical areas which may yield great benefits for humankind.

For private companies relying on public knowledge, aggressive patenting would diminish the long-term supply of knowledge and this will be detrimental to the survival of these companies.



**Knowledge@SMU:** What suggestions do you have for mitigating some of the adverse effects?

**Huang:** I think the first step is to be aware that there is such a problem, [which] for the first time has been shown through a large-scale systematic empirical study instead of just anecdotal evidence that the problem exists. Once government policy makers as well as private and public institutions are made aware of these problems, they will think of ways to address them. Next is to have better access to information, to make it easier for companies, institutions or individuals to know what has been done, what has not been done, what is covered by intellectual property rights, and what has expired.

In addition, people are also talking about cross-licensing and patent-pooling. A lot of companies may file patents to protect their own findings and for strategic purposes. When they negotiate with their competitors for a valuable piece of intellectual property, they could say they have A, B, C and they need D, E, F from their competitor. Then they could do an exchange. A lot of times patenting is done defensively. Patent-pooling is when two or more companies agree to pool some patents together for cross-licensing to reduce coordination and transaction costs. There can be some mechanisms through which outsiders can have access to the patents, for example by paying a certain amount of fees. I'm not saying take away patents, but there should be some reforms or gradual changes to the system to reflect what's going on today, and to encourage important research and the innovations of tomorrow to take place.

Furthermore, there are things that management and economic scholars can bring to the table, using robust, rigorous conceptual as well as analytical framework to design, research and study important technology policy questions with implications for both the public sector as well as private firms. This will allow better management of technology and innovation.

Nowadays in the US, when a scientist or researcher wants to patent a finding, oftentimes the relevant authorities are more sceptical. Usually, the technology licensing offices of universities and other institutions will advise the scientist that patenting is not necessarily the best way to go. It is expensive and takes many years (typically two to five), so they may suggest that the scientist or researcher consider other means of protecting their intellectual property.

**Knowledge@SMU:** What other means are there?

**Huang:** A well-known one is secrecy — just don't tell people. For example, Coca-Cola adopts secrecy to protect its asset and their coke formula is kept secret. In many industries, the new hires of the companies have to sign a non-disclosure agreement. Other means include copyright, design rights and trademarks which apply in different contexts. Yet sometimes, the best way could be to just quickly go into the market and maximise the profits and exit, because some products can be easily copied.

Our mentality, that patenting is always good and should always be encouraged, needs to change. Only under certain necessary conditions, patenting serves the greatest function. People should be discerning about when to patent, what to patent and what is the best strategy to go about exploiting the innovation.

**Knowledge@SMU:** Are your research findings applicable to other industries?

**Huang:** We should first think about how much those industries rely on patents. For instance, the semiconductor industry does rely quite heavily on patents. Perhaps the findings can, to a certain extent, be generalised to that industry although it has its own different industry dynamics. On the other hand, the findings may not be so applicable to software or design industries because it is much easier to circumvent those patents. So I would say it applies to industries that need strong patenting protection in countries with strong intellectual property regimes.

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