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1.3 Impact of regulations on innovation

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Abstract

There are many different policies and institutions that affect innovation, including those that create the seeds of innovation; those that manage, create assets from, and distribute those seeds; and those that spread those seeds throughout society to make innovation a reality. In particular, technology regulations have a significant impact on both promoting and inhibiting the diffusion of innovations.

Keywords

Innovation, diffusion, regulation

1 Dissemination of technology and securing of profits

1.1 Technology diffusion and innovation

The basic driving force behind human technological development is the universal demand for greater ease. Indeed, human history is a story of developing technologies, making gradual progress, and making our lives easier. The various technologies have been communicated and disseminated to people in a variety of ways, prompting innovation.

However, modern innovation cannot be considered without taking corporate activity into account. Rather than using the technology as it was developed or passing it on to others for free, the idea is to embody the technology in a product and sell it for a profit, thus satisfying the desire to make things easier. Of course,

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getting paid for the fruits of innovation is an essential part of the cycle necessary for obtaining resources for the next stage of technological development, and is a natural part of capitalist society.

In *Diffusion of Innovation* (1962), Everett Rogers identifies the following five points as important to the diffusion of a technology: 1) comparative advantage over conventional technologies, 2) compatibility with existing user behavior, 3) ease of understanding for users of the technology, 4) trialability of using the technology, and 5) visibility, such that others can see that you are using the new technology. In the diffusion of a technology, it is important that there are young and dynamic innovators who take the risk of adopting the new technology. It is also necessary for opinion leaders—that is, people with significant social influence—to actively interact with innovators and become early adopters of the technology after thoroughly reviewing it. Managing the diffusion of technology in this way is an important aspect of innovation.

1.2 Corporate activities and technology diffusion

If it is essential for a company to benefit from innovation as a corporate activity, then the diffusion of technology requires a sophisticated strategy. The key strategy will address to what extent the technology should be open, and how to ensure a balance between the diffusion of the technology and securing of profits. If the technology is concealed and possessed exclusively, its entire profit can be monopolized; however, the technology will not spread, so the market will not expand and the total profit will not grow. Conversely, if the technology is completely open, it will create numerous competitors who will imitate the technology to manufacture and sell their products. This means that even if the market for a technological product expands significantly, the profit for the company itself will be small.

Moreover, in modern society, profit maximization cannot be the sole objective. Certain technologies should be disseminated and others regulated, even at the expense of individual interests, in order to achieve social stability and security. In other words, it is necessary not only to open up technologies, but to select the technologies that should be linked to subsequent innovation. A variety of social rules have been put in place to achieve such innovation.

2 Control of technology diffusion by institutions

2.1 Ex ante and ex post regulation

While there are various types of regulations, in general, technology regulations are aimed at restricting the use of newly developed technologies so that they do not threaten the safety of society. Nonetheless, in turn, this promotes the spread of technologies that can be used within the scope of the regulations. Many technology regulations stipulate the mandatory use of new technologies, and are thus the very act of forcing the diffusion of technology.

However, in many cases, technology regulations have more of an inhibiting effect on innovation. Their influence is also greatly influenced by whether the regulatory system is ex ante or ex post. Ex ante

restrictions are an attempt to prevent the dangerous or improper use of new technologies by stipulating in detail how they should be used. Japan has a legal system that emphasizes this ex ante regulation. On the other hand, ex-post regulation clarifies the responsibilities of the stakeholders involved in the use of a new technology—including developers, sellers, and users—and establishes rules to hold them accountable in the event of an accident or problem. Countries like the United States have a regulatory system that emphasizes this ex post regulation.

Although ex ante regulations can be expected to reduce the probability of accidents as the parties involved bear a great deal of responsibility, such regulations also make it difficult to use the technology in a challenging or experimental way, which has a significant inhibiting effect on innovation. For this reason, there is a major trend in Japan to change the regulatory system from ex ante to ex post regulation. Nonetheless, ex-ante regulation remains dominant compared to countries like the US, making it difficult to innovate with new technologies. One of the reasons why the US has been able to implement a policy system of ex post regulation is largely due to a comprehensive private insurance system and the public's acceptance of compensation from that insurance. In this context, the strategy of taking advantage of regulatory differences between countries to develop products and create markets has already become commonplace among multinational companies. It is important to note that differences in regulatory systems from country to country can be a cost of doing business or a business opportunity.

2.2 The impact of technology regulation on innovation

As noted above, the majority of regulations will unambiguously serve to stifle innovation. However, in practice, regulation often drives innovation. Of course, regulations pertaining to the spread of new technologies are necessary controls shaping the dissemination of these new technologies. These regulations not only promote safe innovation of the technology concerned, but lead to the creation of many new technologies that reduce related risks. In fact, many new technologies are known to have been created because of regulations. More recently, regulations have been created to encourage technological progress.

2.2.1 Innovation through technology regulations

One of the more famous innovations created by regulations is the CVCC engine by Honda. The CVCC engine is a technology that was created in response to the Clean Air Act Amendments Act (commonly known as the Muskie Act), which was introduced in California and other parts of the United States in 1970, and has been the subject of many innovation studies.

2.2.2 Regulations that sustain innovation

Regulations generate innovation to satisfy them. However, once the regulations are met, there is no need for further innovation, so technological development often stagnates. Revised in 1999, the Act on

Rationalizing Energy Use (hereinafter, the Energy Conservation Act) is a law developed for the purpose of overcoming this problem. The act features various devices, including the Top Runner method.

2.2.3 Innovation using regulation

As regulations have a significant impact on innovation, managing the regulatory environment in parallel with technology development is also an important issue for business success.

Biodegradable fishing line, developed about fifteen years ago, is an example of a product that was not commercialized because it failed to take advantage of regulation. While this type of fishing line was a little weaker and a little more expensive than regular fishing line, it was more than adequate for fishing in rivers and lakes, and offered high value in terms of protecting the natural environment. The people involved lobbied the relevant ministries and agencies after the product was developed, as there would be a large market if they could make it mandatory to use such biodegradable fishing line for fishing in national parks. However, this proved difficult, and the meantime the company that developed the product eventually withdrew from commercializing it.

2.2.4 Innovation driven by regulatory reform

A unique feature of the electric power-assisted bicycle is that regulations recognize that this product is a “bicycle.” More specifically, Article 2, Paragraph 1, Item 11-2 of the Road Traffic Act stipulates that “bicycles that have a motor to supplement human power”; therefore, electric power-assisted bicycles are recognized as bicycles. This is why electric power-assisted bicycles do not require a license or helmet, even though they are products with a motor. In the case of the electric power-assisted bicycle, it was possible to develop a motorized bicycle that can be operated in the same way as a conventional bicycle using advanced technology and, by amending the Road Traffic Act, its inventors succeeded in creating innovation by having it recognized as a bicycle. They have also been recognized as safe and equivalent to conventional bicycles, resulting in regulations being relaxed in favor of stronger power-assist features. There is a strong relationship between deregulation and strengthening of regulation, which should be kept in mind when achieving innovation.

This paper is a summary of Chapters 11, 12, and 15 of Hitotsubashi University’s Institute of Innovation Research (2017), and further detail can be found in this book.

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