# Enhancing the Circulation: Some implications on the Open Source policy and IT industry promotion

Sangmook Yi[1], Tetsuo Noda[2]
1 Duksung Women's University, Department of Business Administration
Seoul, Korea (endien@gmail.com)
2 Shimane University, Faculty of Law and Literature Matsue, Japan
(nodat@soc.shimane-u.ac.jp)

**Abstract**. Open source has substantial potential that attracts countries who is seeking for the economic development and achievement in IT industry. Specially for Asian countries, open source is now regarded as an important issue of policy making to absorb fast development of IT industry and explore sources of building new competitiveness. During this workshop, the creation of technological knowledge through open source and its use are reviewed through findings of eight researches. As a result, the key function of the policy on promoting open source will be defined as circulation of knowledge through open source as well as growth in market economy.

## 1 Introduction

For the past 20 years, engineers in IT industry have received the most attentions and notions than before (Lerner and Tirole, 2005a). 'Open source', the voluntary cooperation among IT developers, means more than a software development project in the economic world today (von Hippel and von Krogh, 2003). Free Software Foundation (FSF) which opposed to market-dominating companies now thrived into social movement of anti-technocracy of proprietary firms (Stallman, 1999; Yi and Shin, 2007), while companies and governments struggle to exploit open source for market achievement and economic development. For Asian countries that seeks fast growth of IT industry, open source has been regarded as a useful platform of IT knowledge creation and expansion.

However, not all of their policies seem to be successful. For instance, despite of the ambitious introduction of Linux system by a government administration, the market share of Linux in desktop computer market did not increase as expected. Although the promotion to use open source technology has been encouraged, it is still common to utilize proprietary solutions for large and mission critical SI projects. It seems far more evident in countries like South Korea and Japan, where has a long and structured history of IT industry (Yi et al., 2009).

It seems there are unique characteristics in open source field, which do not exist in the proprietary industry. And we see that is the reason why policies for promoting open source have failed to achieve its purpose. The purpose of proprietary firm is, as commonly accepted, to produce market goods for economic incentives, and it also seeks the development of knowledge and technology for such activities. But, the

purpose of open source field is to create and develop valuable knowledge and technology for various software productions. And participants in this field can create more value by keeping this form of knowledge as open to everyone. In short, for-profit firms concern about the use of knowledge for production while open source field aims the creation and maintenance of knowledge through collective development (Yi and Shin, 2007).

However, the nature of open source field does not seem to be understood well among various actors in the economy who try to exploit open source for their own use. Significant number of firms and government administrations tend to regard open source as just some kinds of software or technology (which is even free) (Lerner and Tirole, 2005a). This misunderstanding leaded the policies for open source promotion to the failure in the effectiveness of those policies (Yi et al., 2009).

Thus it is needed to understand further the characteristics of open source field for its promotion and growth in IT industry. Also it needs to be remembered that the impact of such policies are able to diffuse to the related fields through the connections in open system world (Bertalanffy, 1968; 1972). In open source field, there are two circulation systems: one is composed of production and consumption of goods through market system. The other is related to the creation and consumption of knowledge, which goes over the organizational boundaries and carried by collective development. While he former refers to the general market circulation based on classical economic theories, the latter refers to the knowledge circulation, which is made in the process of knowledge creation and its use. Thus it is requested to take these two circulation system into account for growth in IT industry through exploitation of open source. It is important for strengthening the knowledge circulation system by differentiating from former policies that aimed to promote the production and consumption of goods. Also is it important to notice that such a system does not include only one country or a region, but applies to a global scale.

During this workshop, the content and achievements of open source policy implemented in Japan, South Korea, China, Vietnam and Mongolia will be reviewed followed by defining problems of each implementation. There are total 8 researches that will be discussed in this workshop. Findings from the researches will let us know about the interaction between the market system and the knowledge system in the IT industry of each countries where open source was exploited. After that, we will learn more about the conditions and practical ways of promoting open source through proper policies.

## 2 Enhancing the market and knowledge circulations

At the beginning of the 20th century, it is viewed that various social events do not occur independently, but they occur as interactions of various actors in different positions. This was called ‘general system theory’, which focuses on the relationship among actors in the society, and had great impact on the modern social sciences (Boulding, 1956; Bertalanffy, 1962). From this point of view, an economic activity

inevitably followed by the other activities and as a whole, macroeconomic system can be viewed as a network of various actors in the economy (Schilling, 2000; Thayer. 1972). This is exclusively important when it comes to the implementation of the policy since the impact of the policy does not go only to the intended field, but also creates cascading effects in various fields along the chains of economic activities. So when it comes to the ripple effect of the policy, economic intervention of the government needs to build-up virtuous circle where the effect of a policy can spread through, rather than taking direct control in many areas.

One of the typical policies that most countries have taken to strengthen such a virtuous circle is demand-pull policy. Because the ways of sustaining the market circulation can be divided into two: production of goods and its consumption, the demand-pull policy focuses on the growth of demand by expenditure of the government and aims the expansion of firms' production capabilities according to the increased demand (Martin, 1985). This policy was implemented actively in post-war period in order to achieve 'full employment' through the increasing production capability (Smith, 1962). After that, the demand-pull policy was generally accepted as a representative market promoting policy in the macroeconomic system (Holzman, 1960). However, it needs to be focused that the proper production capability should be followed by the implementation of demand-pull policy. If the producer or production capability does not meet the increased demand, the policy will be leaded to over demand and creates a vicious circle in the market. For example, Holzman (1960) suggested that post-war policy by the US government was excessive so it contributed to significant stagflation by oligopoly in each industry.

Compared to this, most advanced countries tend to avoid direct intervention on the production side. Their rationale is that if the demand is sufficient, entrepreneurs will act upon that demand in seeking profits so they will strive to meet the consumers' needs while using various skills and knowledge. Therefore, direct and active intervention became common only among the under-developed countries where technology and knowledge lacks extremely and developing countries which seek fast growth of market size (Evans and Rauch, 1999). As for the limitation of the government policy, the role of the government in development of knowledge was viewed as building supplementary innovation system, not as creating knowledge by its own (Hekkert et al., 2007). Upon this, researchers suggested that through the national innovation system, firms should lead the creation of knowledge and guide the direction of technological development while seeking market achievement (Chung, 2002; Fagerberg and Srholec, 2008; Sharif, 2006).

But respecting the technological development of IT industry for the past decades, it can be found that

There were fairly noticeable contributions on knowledge creation not only by firms but also by voluntary participants in developers' community. Occurrences of various technology standards, in particular, can be viewed as a collaboration of academics, engineers, and related firms rather than achievement by one firm (Tassey, 2000). That is, the revival of IT industry seriously depends on the creation and consumption of technological knowledge outside the firm as well as production and

consumption of IT goods.

Certain knowledge created outside the firm can be shared by anyone while others should be obtained through purchase of the rights of use. Open source have build a circle where open knowledge regenerate. For an example, GPL license, as one type of open licenses, created more opportunity to sustain and develop the knowledge in open source (Lerner and Tirole, 2005b). That is, open source can be seen as a social movement for sustaining the circle of open knowledge rather than a mere plan for generating and sharing free software (Yi and Shin, 2007). Thus, the circulation of technological knowledge should be more focused than the production and consumption of goods applied with technological knowledge when it comes to the policies on promoting open source.

## 3 Successes and problems in OS policy of Asian governments

Throughout these eight remarkable researches, we could understand clearly about the interaction between open-source activities and policies in Eastern-Asia. These studies can be categorized into 3 main interests. Firstly, the studies on the process of knowledge production in Japan's open source field, secondly, studies on the consumption of open-source knowledge in Japan, Vietnam, and Mongolia(especially on the links from the consumption at education field which can be extended the new production of open-source knowledge), finally, studies on the interrelation between the producing and consuming process and governmental policies and IT industry development

The open-source distinguishes themselves from proprietary firm by its ability not only to produce software but also to create the ability to produce software. The participant in open-source movement has refuted the dominance of proprietary firms over development of IT technologies, and insisted that the development should be led by developers (Raymond, 1999)
Tansho and Noda (2010)'s study divides a motivation to participate in the open source projects into two factors: a calculative factor pursuing economic interest and an emotional factor pursing social and intellectual interest. It also suggests that open source participants mobilized by regional community strongly concentrated on an emotional factor. This result implicates regional community-based open source activity is more suitable to the intellectual productivity since the activity shows different characteristics from metropolitan participants who do not have designated focal point.

On the similar point of view, Lewis (2010) concerned about a reason why this kind of regional community is existed. He raised a question over the paradoxical situation: an advent of regionally isolated community though in the intellectual economy dominant, which has economy of scale and network effects. Lewis discusses functional advantages and operational possibilities of regional community

while rebutting currents research's claim that open source developers could not enter into a global community due to language barriers despite they are eager to perform on the global stage.

To sum up these studies, it is possible to assume that Asian open source developers are making in progress with distinguishable points from the American-based global community. In other words, different open source participation patterns could be observed on the regional characteristic even in an open source community where online cooperation is the main engine to sustain. And it is not easy to deny that these characteristics come from industrial individualities of respective countries and cultural differences.

Another stream of open source activities is to apply their own needs by acquiring open knowledge, not participating in the production of open knowledge which users can easily access. Developers can produce software, usable in the diverse industrial requirements, relating to their fields with free distribution of information technology. In addition, open source developments entail the variation and improvement of new open knowledge and lead production of new knowledge at all.

In this context, Kobayashi and colleagues (2010) account in detail about the changes of electronic health care management software, used in Japanese health care industry, replaced its commercial software to OSS. The researchers expect that OS health care management software shows infinite possibility to cross the hurdle of functional limitations and inter-operational obstacles in the proprietary vendors.

Of all the open source utilizations, education-supporting system is highly connected to the knowledge production, because it can be used for the cultivation of human resource who may contribute the future production of open source knowledge. We had an opportunity to compare three examples of Japan, Vietnam and Mongolia.
Iio and colleagues (2010) introduce the open source education program co-hosted by numerous Japanese universities. This IPA-architected education program strived to distribute practical information technology and open source knowledge in public with various model courses. These programs shall be the cornerstone to contribute to the sustainment and enlargement of open source fields in the aspect of fostering technicians with only open source knowledge.

Nguyen and colleagues (2010) explicitly confirm that Vietnam National University's example is the another possibility of raising technicians with open source knowledge education. They thought open source can be applied positively to bring up IT human resource, and introduce the outcome of UET's information faculty. These two examples reveal that open source application in the educational field contributes to the knowledge circulation.

Yoshino (2010) reports the Mongolian example that open source application in educational sectors contributes to the development of new open knowledge. The researcher points out that Mongolian public education is in trouble with poor infrastructure, especially in the computer provision, and analyze that the efforts to overcome this hindrance are resulted in localization of open source software. This

example shows that open source applications contribute not only just an application to the education but also development of human resource and knowledge directly.
The knowledge circulation in open source field does not occur without any interaction to the outer economic situation. Sometimes governments, a national economic system controller, accept fruits of open source or are auxiliary to the knowledge distribution. Moreover, open source-bearing knowledge is evolving throughout competition or cooperation with the IT industry which uses similar technologies.

From the perspective of this point of view, Kim (2010) reviews the history of open source promoting policy carried out in South Korea. The researcher introduces diverse methods of South Korean Government to promote open source to deter proprietary software-driven monopoly in the IT industry. He sorts out the Government's policy into supply supporting policy and demand promoting policy, and describes the procedure which open source-based knowledge be linked to the production and consumption in the IT industry.

While Wang (2010) depicts the Chinese situation where open source software grow as main pillar of IT industry through the competition with proprietary firms. In particular, many Linux vendors can be highlighted as a good example of interaction between open source circulation and IT industry. The researcher suggest the outcome originated from institutional layer such as law framework to protect intellectual property, and public policy layer to balance the market, and industry and association layer by economic entrepreneurs.

## 4 Conclusion and Discussions

In this note, we examined that the role of the policies on promoting open source is not only to make the market-circulation of IT industry but also to support producing and consuming an open knowledge itself. Throughout this workshop, we had a good chance to understand more about production side and consumption side of open source knowledge in the Asian countries. Furthermore, this workshop allowed us to compare differences between the open-source movements, which is varied with their nations. These valuable researches can stimulate further studies on open-source, and will provide fundamental information for open-source policy and IT industry in general.

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