

Green Patent 3.0: How to Promote Innovation for Environment beyond Green Channel

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Abstract--In 2007 Conference of PICMET, I presented a paper "Green Patent -- Promoting Innovation for Environment by Patent System" to explore a kind of fundamental solution by refining the patent system. In order to alter the direction of the policy context of innovation, I introduced a new examination criterion, greenness, into the patent system, and discussed its feasibility and possible impacts. In 2009, UK announced the Green Channel to open a specific examination process for green patent and to fasten the examination speed of innovation for environment. Following the step of UK, Australia, South Korea, USA, Israel, Canada, Brazil, China and Taiwan open various kinds of Green Channel for green patent application. However, the scheme is required to answer "What are green patents?" in advance. To solve this issue, the US EST Concordance was created to serve as a broad guide. EPO and WIPO announce the IPC Green Inventory. All of these institutional changes are in accord with my ideal of Green Patent. This research is aimed to discuss the differences between the executed Green Channel (Green Patent 2.0) and the PICMET 2007 version of Green Patent 1.0, and finally propose a more comprehensive scheme of Green Patent 3.0.

I. INTRODUCTION

Technological development is the engine of modern economic growth, but it also is the key factor of global environmental crisis. [1], [15] and [29] had proposed the programs with engineering perspective, like "Design for Environment" and "Cleaner Production". However, these programs had the difficulties to motivate all the firms and innovators to follow. To solve the global environmental crisis, many scholars¹ had called for "a Climate Change Manhattan Project", and some other scholars² had asked for an "Apollo Program" of technology policy to develop the necessary technologies by the Governments. Policy advisors³ had proposed the "Green New Deal" as a third policy model to support the full range policy reforms needed to deal with global warming. These proposals induce three important innovation management scholars, D.C. Mowery, R.R. Nelson and B.R. Martin, step forward to discuss the arguments between technology policy and global warming, and directly ask "Why new policy models are needed", as in [22]. This paper is trying to propose a new policy model of patent system.

The paradox between economic growth and environmental crisis rooted in the choice of the direction of

technological development. Innovators usually emphasize the novelty and economic usefulness of an innovation but neglect its environmental impacts. This ideology was embodied into the institutional design of the patent system. From 1623, the origin of modern patent system in England has emphasized that only innovations which are "new" and "having benefit for the State" deserve patent protection. In 1993, the Article 27 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) has clearly stated that the following conditions of patentability: new, involve an inventive step and be capable of industrial application. The last two items are "synonymous with the terms 'non-obvious' and 'useful' respectively." Therefore, in general, an innovation could be granted a patent if it can pass the examination of the following three (only three) criteria: novelty, non-obviousness and usefulness. This kind of institutional design constrains the thinking process of innovators in return -- they strive to invent something new and profitable regardless of the environmental impact. As a result, the environment continues to be sacrificed. To remedy this situation, the government applies various types of environmental regulations. But those regulations can only limit the discharge of pollution to a certain extent. It requires the pollution abatement technology to resolve the pollution. However, if we keep allowing the patent system to reinforce the "new and useful but dirty" innovation for economic growth, and then depend on the pollution abatement technology to do the end-pipe treatment for environmental protection, we not only waste resources but also put ourselves into a dilemma: need to tradeoff between economic growth and environmental protection.

In this study, I try to explore a fundamental solution to this dilemma. Because the global environmental crisis is mainly due to the environmentally naïve development of technology, we should alter the direction of technological development. To change the technological choice of each individual who is involved in the innovation process, we need to refine the policy context of innovation, especially the patent system that motivates the innovation and diffuses the innovative information.

II. GREEN PATENT 1.0

In 2007 Conference of PICMET, I presented a paper [14] "Green Patent -- Promoting Innovation for Environment by Patent System" to refine the patent system. Although [4] and [6] had called for a reforming of the global patent system, my proposal explore a kind of fundamental solution. In order to

¹ As in [21], [12], [2], [26] and [28].

² As in [7] and [16].

³ As in [9], [3], [5].

alter the direction of the policy context of innovation, I introduced a new examination criterion, greenness, into the patent system, and then its discussed necessity, feasibility and possible impacts. By incorporating this environmental concern into the patentability examination, we hope the patent system might induce the innovator to invent “new, useful and green” products and processes.

Because the traditional criteria of patentability induce the innovator to invent environmentally naïve technology, we suggest adding a new criterion – greenness or extending the meaning of usefulness to include environmental concern⁴. The examination process could be as follows:

1. Ask the innovator to describe the environmental impacts of the innovation (including the materials used, the manufacturing process, and the usage and disposal period) in the patent specification.
2. As current practice, encourage the other firms or innovators expose false specifications. If the falsity is confirmed after examination, the patent will be nullified.
3. If the innovation is radical (i.e. there is no precedent), then its environmental statement is automatically accepted.
4. If the innovation is not radical (i.e. there is precedent), then we need to compare the environmental statements of the new applicant and its precedents. The environmental performances of the new applicant must be superior to those of its precedents. If the new applicant is inferior in any one item of environmental performances, it losses its patentability.
5. If an innovation passes the four criteria (novel, non-obvious, useful and green), then it is patentable. The examiner and judge will determine patent scope according to the specification, claim, and the progress of novelty and greenness. For example, if an innovation is greener than its precedent to a substantial degree, it may be granted a patent independent of its precedent. Its patent scope may cover part of its precedent's.

Under these rules, every innovator needs to keep environmental protection in mind and strive to improve the greenness of innovation. For current dirty patents, the innovator will actively improve their greenness in order to apply for a new patent. To get a new patent, the innovation must be green enough. Even though it is a radical invention (the greenness is not required for the first of its kind), its innovator also would strive to lift up its green level in order to reduce the risk of being replaced. This is an institutional mechanism that automatically induces the innovator to improve the greenness of innovation and to invent something new, useful and green.

⁴ Recall that the origin of modern patent system in England has emphasized that only innovations which are "new" and "having benefit for the State" deserve patent protection. Including environmental concern into usefulness criteria exactly fulfills the meaning of "having benefit for the State".

The Definition of Greenness

Greenness is difficult to define. If we take the eco-efficiency, defined by World Business Council for Sustainable Development (WBCSD), as an example, then greenness has seven dimensions:

1. Reducing the material intensity of product or service.
2. Reducing the energy intensity of product or service.
3. Reducing the toxic dispersion.
4. Increasing the recyclability of materials
5. Employing the renewable resources as much as possible.
6. Increasing the durability of product
7. Increasing the service intensity of product.

These definitions name just a few among others. It is impossible to set a complete definition of greenness in advance. However, we should remember that, although "novelty, non-obviousness, usefulness" are also difficult to define, the patent system has successfully promoted new and useful innovations for three hundred years. This is because the patent examination is based on a comparative standard. We do not need to set the complete definition in advance but compare the new patent application with its precedents case by case. We will examine the greenness of innovation in the same way.

This point will be made clear by studying the nature of patent. A patent is a contract between the innovator and the government. This contract is initiated by the innovator. The innovator actively describes the specification of the technology, and discloses it in order to exchange the governmental protection of an unknown market. If the government can specify the technology in advance, it can set a prize⁵ to encourage innovators to invent that technology. If the government knows the market size of an innovation, it can purchase⁶ the innovation for the society. However, in general, the government cannot specify an innovation in advance and has no idea of its market size. This explains why the patent, not prize nor procurement, is the main policy instrument for the government to encourage innovation. By employing the patent system, the government does not need to specify an innovation in advance or to know its market size, but can still effectively promote "novel, non-obvious and useful" innovations. In the same way, the government does not need to specify the greenness of an innovation in advance, but still can effectively promote the green innovation. Greenness is difficult to define but the unique nature of the patent system makes it easier.

Our proposal cannot be totally exempted from the difficulties of evaluating the environmental impacts of a patenting technology but can create the following mechanism that continues to reduce these difficulties.

1. The innovator and his competitors will actively provide the environmental information of the new technology in the patenting materials. After being examined by the

⁵ Like *Presidential Green Chemistry Challenge Awards Program* in U.S.

⁶ Government may apply green procurement to encourage green innovation.

relevant experts in the patent authority or in the court, the certified information becomes part of a valuable databank which will greatly reduce the difficulty of environmental impact assessment.

2. The environmental specification of the issued patents provides guideline for the innovator to evaluate the greenness of his innovation. The innovator may learn how to do the Life Cycle Assessment (LCA), what items should be included, which method could be applied, and what kind of scientific results might be referred to.
3. The patent databank provides up-to-date information of green innovations. Innovators can learn the ways that make technology green and can find cleaner components and materials. Innovators can also find the technological opportunities to improve the greenness of the issued patents.

This is a living mechanism. It guides all innovators and accumulates their wisdom to identify the practical meaning of greenness in real cases. Many pollution problems may not be identified when the technology is just innovated. Therefore, it is impractical to expect a complete definition of greenness at that time point. Also, green patent system may involve controversy, but the greenness of innovation will surely continue to improve.

III. GREEN PATENT 2.0

In 2009, UK announced the Green Channel to open a specific examination process for green patent and to fasten the examination speed of innovation for environment. Following the step of UK, Australia, South Korea, USA, Israel, Canada, Brazil, China and Taiwan open various kinds of Green Channel for green patent application. However, the scheme is required to answer "What are green patents?" in advance. To solve this issue, the US EST Concordance was created to serve as a broad guide for the classifications of ESTs (environmentally sound technologies) in Nov. 30, 2009. UK set up the Database of Green Channel Application in June, 2010. In the same year, EPO built up the Classification Scheme of patents for climate change mitigation technologies, and WIPO announce the IPC Green Inventory. After President Obama's 2011 State of the Union address, the United States Secretary of Commerce Gary Locke announced the Green Technology Pilot Program, as in [24]. The Green Technology Pilot Program is a program the United States Patent and Trademark Office (USPTO) adopted to expedite the patent examination process for "green" patents. All of these institutional changes are in accord with my ideal of Green Patent 1.0 System. It shows that governments around the world have recognized the legitimacy of refining patenting procedures as a mechanism to promote and accelerate green innovation. By incorporating environmental concerns into the patent application and examination process, we all hope that the patent system might induce the innovator to invent "new, useful and green" products and processes.

However, there still have much space to improve.

First, the institution should be globally harmonized. The green patent fast track programs of different countries vary widely in their rules, both in eligibility requirements and process parameters, as in [19]. Due to these disparities, it can be costly and time consuming for patent applicants to select which green technology patent fast track programs to apply. [19] suggests a standardized and balanced international system of expedited examination to encourage greater participation in green technology fast track programs and reduce the time to grant for a larger number of green patents, thereby fostering development and diffusion of green technologies.

Second, the institution should be simplified. Although there are so many expedited patent examination systems, there are not so many patent applications to utilize these systems. For example, [24] mentioned that the Green Technology Pilot Program of U.S. has not received as many applications as originally expected. More recently, the USPTO has eliminated some requirements restricting applications.

Finally, and most importantly, the institution should not restrict the green technologies fields on the announced list. Although the USPTO has extended the length of the EST (environmentally sound technologies) list, it is difficult to have a complete set. It is more robust and subtle exploiting the relative comparison mechanism in Green Patent 1.0 to accumulate and approach the definitions of greenness, rather than relying on the list announced by the bureaucracy.

IV. GREEN PATENT 3.0

[25] had argued that, in order to develop environmental innovation, public policy makers must solve a "double externality" problem⁷, namely the presence of both environmental externalities and knowledge externalities. Environmental regulations can provide the demand⁸ of environmental innovation, and technology policies can remedy the spillover of knowledge and encourage the supply of environmental innovation. Green Patent system provides a synthesis policy regime for the demand and supply of environmental innovation.

[20] argued that the design of patent system would affect the innovation and international diffusion of environmentally responsive technology. Besides providing a protected demand vision of environmental innovation and hasten the examination process as Green Patent 2.0, Green Patent 3.0 would emphasize the spillover of green knowledge as Green Patent 1.0. [27] had discussed the relationship between patentability criterion, e.g. novelty, and information

⁷ This insight has been echoed by [13] which studied the determinants of environmental innovation.

⁸ Although [17] and [18] contested that different environmental policies provide different incentives for developing pollution abatement technology, the main effect of environmental regulations is still providing the demand of environmental innovation.

disclosure of patent. By lowering down the thresholds of novelty and non-obviousness, Green Patent 3.0 can fasten the progress steps of series patent and narrow the scope of each patent (and then reduce the motivation of patent litigation). To avoid the costly litigation of patent wars, the Federal Trade Commission (FTC) has recommended an administrative procedure for post-grant review, as in [8] and [23]. [10] and [11] have argued that a properly designed U.S. post-grant review could generate high welfare gains.[8] had estimated possible benefit-to-cost ratios to the US implementing PGR in the range of 4:1–10:1. The major difference between Green Patent 3.0 and Green Patent 2.0 is the post-grant review (PGR) system of greenness.

V. CONCLUSION

This research discussed the differences between the executed Green Channel (Green Patent 2.0) and the PICMET 2007 version of Green Patent 1.0, and finally proposed a more comprehensive scheme of Green Patent 3.0. Green patent is not a substitute but a complement of environmental regulation. Basically, green patent is a regime to encourage clean innovation and environmental regulation to prohibit dirty production.

To put this ideal proposal into practice, we need the suggestions from innovators, examiners and the other stakeholders. We also need to study more R&D cases to understand the real problems to improve the greenness of innovation. To do a more complete analysis of social cost and benefits, the model should endogenize the innovation process and show the redundancy of developing polluting technology and pollution abatement technology rather than green technology under limited R&D resources.

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