

# The 2019 Technology Transfer Society Annual Conference

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**Session 1.3 – Chair: Phil Shapira**

**Location – 208N**

**Title:** Limiting innovation? Patenting impacts following the U.S. Supreme Court decision in *Alice Corp. versus CLS Bank*

**Authors:** Jesse Frumkin, Nicholas A. Pairolero, Asrat Tesfayesus, Andrew A. Toole

**Presenter:** Andrew A. Toole

**Abstract:**

Legal uncertainty in intellectual property rights (IPRs) can severely limit innovation. Prior research shows that uncertainty over IPRs reduces the value of patents, the ex-ante incentive to invest in innovation, licensing transactions in markets for technology and challenges to monopoly markets by entrants. This paper uses a natural experiment to investigate whether courts can change the uncertainty innovators face when seeking patents on their inventions. Specifically, we analyze the impact of the 2014 U.S. Supreme Court decision in the *Alice vs. CLS Bank* case (hereafter *Alice* case) on examiners' decisions to grant patent protection by the U.S. Patent and Trademark Office (USPTO).

Among other requirements for a patent, an invention must qualify as patentable “subject matter.” United States Code 35, Section 101 (35 USC § 101) states: “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” Over time, however, the U.S. court system has determined three major judicial exceptions to the “process, machine, manufacture, or composition of matter” definition of patentable subject matter. These are abstract ideas, laws of nature, and natural phenomena. In the 2014 *Alice* case, the U.S. Supreme Court extended prior judicial decisions by increasing the requirements for any invention that involves abstract processes. Following the *Alice* case, the USPTO must apply a two-part test to evaluate whether inventions involving abstract processes are patentable subject matter. This decision dramatically changed how software and business method patents are evaluated for patent protection and introduced the possibility that existing patents for software and business methods are no longer valid and enforceable in the court system.

Using the Supreme Court decision as a natural experiment, our analysis uses a difference-in-difference methodology to test whether the court decision increased uncertainty about patentability and increased the threshold required for patents on technologies involving abstract processes. The richness of recently released USPTO office action data allows us to identify specific reasons for increased uncertainty and rejections at the application level. Further, we exploit internal USPTO data to control for fixed characteristics of examiners that affect patent granting decisions. Additionally, we exploit patent application classifications and abstract language use in patent claims to identify *Alice* at-risk patent applications. The unique characteristics of our data and identification strategy allow for the first causal identification of the impact of ambiguous judicial decisions on increased uncertainty in intellectual property rights.

**Title:** Patent technological diversity and pendency time

**Authors:** Kejia Zhu, Yaohan Li, Shavin Malhotra

**Presenter:** Kejia Zhu

**Abstract:**

The last few decades have witnessed a fast growth of patent filings. With the upsurge in patent applications, patent offices are increasingly challenged to optimize the limited examination capacity to decide valuable inventions that will benefit the society, while reducing backlogs so that applicants can receive examination results as fast as possible (Harhoff & Wagner, 2009; Régibeau & Rockett, 2010). Hence, it is important to understand what affects the pendency time of patent applications (i.e., duration of patent examination).

In this study, we focus on the effect of patent technological diversity on application pendency time. This is intrigued by the increasingly prominent view that there seems to be a decoupling between patents and breakthrough innovation: despite the increasing amount of patents, breakthrough innovation is still limited. This makes one wonder how inventions with different levels of innovativeness go through the patent examination process, as this can significantly affect technological landscape. Innovation is often seen to arise from knowledge recombination; and we adopt this recombination view and examine how patents technological diversity affects pendency time.

We attempt to answer this question based on a sample of 283,884 pharmaceutical applications filed between 1985 and 2017 at China's State Intellectual Property Office (SIPO). Using Cox proportional hazard rate model for competing events, we find a U-shaped relationship between patents' level of technological diversity and pendency time. That means, when the level of patent's technological diversity is moderate, the pendency times for both grant and rejection are the shortest. We theorize that this is because as patents' technological diversity increases from low to moderate, their novelty and inventiveness (i.e., non-obviousness) become increasingly evident to the examiners without much time or effort. However, as technological diversity continues to increase, the information that examiners need to process will increase exponentially for them to evaluate applications' practical applicability despite their novelty and inventiveness, thereby increasing the time necessary for decision-making.

Moreover, we also find that this U-shaped relationship can be moderated. In particular, we find that as the inventor team becomes larger, the extra time that examiners need will be reduced to make the grant decision for applications with high level of technological diversity. We suggest this is because larger inventor teams have a higher absorptive capacity (Cohen & Levinthal, 1990) and therefore can better integrate diverse technological elements in one invention without much confusion, thereby facilitating the patent examination process and reducing the grant decision time. In addition, our findings also show that those applicants who use patent agents to file their applications will also see a reduced granting time despite the level of technological diversity of their patent applications.

Our findings have important implications for the design of an efficient patent system. They can also provide insights for organizations who seek to better understand the patent examination process in order to manage their innovation strategies. Finally, the findings seem to suggest that breakthrough innovation might experience serious delays going through the patent system successfully.

**Title:** To patent or not to patent: Open innovation mechanisms within an emerging personalized medicine innovation ecosystem

**Authors:** Andrew Park, Elicia Maine

**Presenter:** Andrew Park, Elicia Maine

**Abstract:**

Personalized medicine is a rapidly growing subsector spanning medicine, biotechnology, and information technology, which is forecast to transform medicine, bringing benefits to patients and medical professionals and reducing overall system costs. The emergence and growth of such science-based innovation ecosystems rely heavily on open innovation: the science ventures seeding these ecosystems frequently need to access complementary assets, finance, and may need to contribute to the formation of new regulations and policies. Little is known about the mechanisms employed by science-based ventures in order to attract the alliance partners and investors they require, nor the innovation policy which would enable such mechanisms. In following an open innovation model, it is uncertain how leading and following science-based ventures differ in managing knowledge spillovers during collaboration (Arora et al., 2016). If firms are successful in contributing to a growing innovation ecosystem using open innovation strategies (Chesbrough, 2006), there can be broader societal and public policy implications in encouraging further open innovation (Chesbrough & Bogers, 2014).

This paper builds on the notion of selective revealing of knowledge in order to enhance value creation and capture (Dahlender & Gann, 2010). Specifically, we address the research question “How does selective revealing affect innovation performance and value capture by science-based ventures?” To address this research question, we investigate the emergence of a personalized medicine innovation ecosystem in BC, analysing the open innovation mechanisms employed by science-based ventures and the value outputs of these firms.

We contribute to the open innovation literature by addressing the seemingly contradictory positions of Henkel et al. (2014), who argue early selective revealing positively effects firms’ competitiveness and West (2003) who states firms prefer proprietary strategies “whenever possible”. Our results show that both selective revealing and strategic timing in personalized medicine firms tends to lead to higher value outputs, moderated by uncertainty of the environment. This suggests an open innovation framework can be helpful to a firm’s commercialization, but a firm must also consider the breadth and timing of its intellectual property protection (Maine & Thomas, 2017). Moreover, Dahlander & Gann (2010) note that most open innovation work focuses on observations from American software technology companies such as Microsoft, Intel, and the Linux Foundation, and they encourage future work to explore other contexts to improve external validity. Our study focuses on the emerging personalized medicine industry, which encompasses greater technological uncertainty.

We contribute to practice by providing initial guidelines and insights to both individual firms and public policy makers to encourage the growth of the personalized medicine ecosystem in their jurisdictions. Given the long timelines to commercialization, particularly for personalized medicine therapeutics companies (Pisano, 2010; Maine & Seegopaul, 2016), and the risks and benefits involved in openness and selective revealing (Gans and Stern, 2003), firms must strategically navigate not only their own technological

capability development but also their relationships with surrounding firms, universities and other public entities.