

## **Empirical Study of Patent Litigation in Ag-Biotechnology and Empirical Analysis of Patent Citations**

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A database of all the completely resolved patent lawsuits filed in 1995 and 1997 in all technological arenas will be expanded to include data for cases filed in 2000-01. This comprehensive database will allow exploration of how recent changes in the procedure governing patent litigation have been implemented. In addition, since the rate of economic growth peaked in 2000 and was slowing in 2001, we will be able to explore whether general economic conditions influence the level of expenditures and value of a formal ruling in patent cases, an area which has not been explored in the analysis of civil litigation.

In collecting this data, we are relying on two data sources. First, we extracted all cases identified in the court data prepared by the Administrative Office (AO) of the U.S. Courts. This database provides basic information on cases filed, the districts in which they are filed, and the identification of the parties involved and will be supplemented with individual case docket reports coded to record detailed information about each patent case: the number of parties, whether a jury was requested, the judges overseeing the case; the duration of the case and number of documents filed in the case; who won the case; whether the case was terminated through a verdict, ruling or some form of settlement; the nature of damages and the individual patents involved. This research will extend these results by examining how the nature (such as whether they are firms or individuals or domestic or foreign; firm size and financial indicators; location of operation and incorporation; and industries in which they participate) of the parties involved in patent litigation influences case outcomes and the resources devoted to litigation in various technological arenas including the nature of the parties in patent suites.,

Another area of interest is the nature of the patents themselves. Factors such as technological sector, the age of the patent, and breadth of patent may influence how aggressively litigation is pursued. Only about 30% of the docket reports contain actual patent numbers. However, we are in the process of collecting the patents for all the cases in our cohorts using relatively expensively priced commercial data sources.

Thus, this work will contribute to several areas of research. It will examine how well the courts serve their function in enforcing the patent system and generate normative suggestions for improvements in our patent system so its serves its goals of encouraging innovation without stifling dissemination in various technological spheres. It will also broadly contribute to the general literature on the role of trials and settlements in civil litigation.

Patent citations are used to develop a patent classification system that is adaptive to the characteristics of a specific industry. The patent classification system is based on patent similarities to assist patent managers in understanding the basic patents for a specific industry, the relationships among categories of technologies, and the evolution of a technology category.

Patent citations also allow citation mining, which is an integration of citation bibliometrics and text mining. Text mining is performed on the citing papers to identify the technical areas impacted by the research, and the relationships among these technical areas. Identifying the characteristics of the citing community would provide one perspective on the diversity of impact that these patents have had.

Examining patent citations eventually allow for monitoring to identify environmental scanning and issues management or developments likely to affect an organization over the coming few years. Monitoring assumes that technological change is foreshadowed by changes in

related technologies and/or in the socioeconomic context. Thus, identifying those signals from the environment, and analyzing them with respect to one's organizational interests and capabilities should contribute to technological forecasting and planning. In addition, co-citation identifies pairs or groups of articles that are cited together in other patents. From these, a cognitive structure is then derived, providing information on the evolution of R&D in an industry.

*Impact of: Empirical Study of Patent Litigation in Ag-Biotechnology.* This effort focuses on the role of the court system in the structure of the US Patent system in various technological arenas including ag-biotechnology. The US patent system has only a limited administrative process for post-grant review of patents in order to challenge the validity of issued patent claims. It is assumed that the validity of issued patents will be challenged/tested through the courts and arise in the context of a patent infringement lawsuit in which the validity of the claims at issue is reviewed by the court. If some or all the claims at issue in the patent lawsuit were improperly issued by the Patent Office, then a district court can step in and declare them invalid. Thus, the US Patent system is essentially a two-stage system utilizing two institutions with very different structures: the Patent Office, which grants the patent, and the court system which is used as an instrument for not only protecting and enforcing patent rights but also for maintaining the integrity of the process used to grant those patent rights.

The patent litigation system has its shortcomings. A patent infringement lawsuit can have very high transaction costs which tend to create incentives for the parties to settle their disputes rather than seeking a final judgment on the merits. The courts may also favor settlement since in civil cases it is generally more efficient to promote a resolution of a dispute without the expense of a lengthy trial. However, society may have an interest in seeing these disputes decided through a formal adjudication of infringement or invalidity of the patent claims at issue, and neither the parties, nor the courts, have an incentive to take the social costs and benefits into account. Moreover, a patent is a "right against the world" and all members of society have an interest in seeing that the monopoly power given to the patentee was fairly granted. However, only an alleged infringer has the right to challenge the validity of the patent in court.

Empirical work examining the actual resolution of patent cases is relatively sparse, and focuses largely on the small number of patent cases which actually go to trial. The conventional wisdom is that the vast majority of cases do not go to trial and are instead resolved in some other way. Given the importance of the courts in the enforcement of patent rights, the cases that escape adjudication are as important as those which obtain a formal ruling. Thus, this empirical research will focus on the resources expended on patent cases, how common various rulings by the court are, and what factors influence research expenditures and the rate of adjudication in various industries.

*Impact of Empirical Analysis of Patent Citations:* Despite the consent that patent citations reasonably reflect innovation networks in the economy, there is little attention paid to the actual network structures in which innovative activities take place. Most of the top ten percent of published authors collaborate to produce articles for publication in top-tier journals, a finding that is consistent with a documented trend towards multiple authorship (clique) in scientific publishing. Thus, using an innovation network (i.e., a clique) as a unit of observation, instead of individual patent citations, may be more appropriate to examine information embedded in patent citations.

Technology monitoring and forecasting aims can be served by bibliometric analyses. Linkage counts provide evidence as to how R&D is impacting other R&D fields, indicate who is involved, and can suggest further applications. Organizations engaged in research and technology development need to identify and explore emerging technological opportunities. Technology Opportunities Analysis (TOA) draws on bibliometric methods, augmented by expert opinion, to provide insight into specific emerging technologies. TOA performs value-added data analysis, collecting bibliographic and/or patent information and digesting it to a form useful to the research or technology manager, strategic planner, or market analyst. The TOA combined with the concepts of a clique in the innovation network is likely to generate useful results for patent management and for intellectual property management.

The patenting process itself is important in generating citing-cited patent pairs, and cited patents are likely to contribute to dynamic knowledge transfer between inventors and their patent attorneys from the current to the future inventions, rather than to reflect on knowledge transfer between the inventors during the process of invention.

These issues raise a point that when patent citations are used to analyze knowledge transfer, its concept needs to be broadly defined. Knowledge transfer reflected in the patent citation includes not only transfer between inventors within the same time frame, but also transfer between inventors across different time frames, between inventors and their patent attorneys, and among inventors, their patent attorneys and patent examiners. It appears unreasonable to attempt to separate patent citations according to who made those citations. It seems rather more sensible to investigate knowledge flows collectively taken place by inventors, patent attorneys, and patent examiners within and across different time frames. These points further affirm the concept of a clique and a need to examining patent citations.

In this process, examiners develop classification codes based on individual claims and search for prior art that is relevant to those claims. This endogenous process would be consistent with a pattern in which examiners match citing and cited patents on technology to a greater degree than inventors. This observation leads to a consideration of a system of equations consisting of patent classes and prior art citations and implies that there is a need to include patent classification into the model forming a system of equations.