



Comparison of Statistical Quality Indicators of Patents in CAFC Decisions

Before and After KSR V. Teleflex

Author: Andy Gibbs

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ABSTRACT

This study uses computer modeling to identify and analyze any changes in patent quality indicators between two sample groups of patents: patents in cases decided by the Court of Appeals of the Federal Circuit (CAFC) during 2006, and patents decided by the CAFC during the first 9 months following the Supreme Court decision in KSR v. Teleflex. While statistical patent analysis does not play into CAFC decisions, a fundamental shift in patent quality may point to indices that owners may consider as important data points in support of decisions related to patent acquisition, invention disclosure analysis, portfolio building, and enforcement and litigation strategies. This objective analysis of patent quality showed considerable change in overall patent quality following KSR, including substantial quality increases in legal, commercial and technology scores, as well as scores related to claim scope, invalidity confidence, likelihood of litigation, and other key indicators.

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"KSR defines new baseline for statistical patent quality"

SUMMARY

On April 30, 2007, the Supreme Court decision in *KSR v. Teleflex* (KSR)¹ invalidated U.S. Patent No. 6,237,565, and established a new standard for OBVIOUSNESS under 35 U.S.C. §103. The ruling held that the Federal Circuit's application of the "teaching-suggestion-motivation" (TSM), the long-standing test for obviousness, was interpreted in a "narrow, rigid manner inconsistent with §103"².

Following the Supreme Court decision, KSR has been cited in a growing number of cases before the Court of Appeals for the Federal Circuit (CAFC). In response to KSR, the US Patent and Trademark Office (USPTO) implemented new *Examination Guidelines for Determining Obviousness*.³

"Because patents granted under the old standard are now vulnerable to challenge, companies with large intellectual-property portfolios will have to reassess the value of their patents. Under the Sarbanes-Oxley law any substantial decline in value must be reported. Companies could be held liable under Sarbanes-Oxley if they fail to look at the record of each patent to determine its vulnerability."⁴

Other intellectual property industry thought leaders, litigation strategists, and patent owners argue subjectively the implications of KSR on patent drafting, prosecution, and enforcement strategy, and recent CAFC decisions in standing cases may influence what new cases should be brought before the CAFC in light of KSR.

Chicago patent attorney Lee Eulgen said that "Making it easier to challenge patents will diminish the value of many existing patents, and that may require corporations to notify shareholders of reduced assets in their intellectual-property holdings."⁵ Moreover, the potential implication of KSR on portfolio value and corporate reporting under Sarbanes-Oxley is still being analyzed. "...decisions [following KSR] are a clear victory for promoting patent quality and more equitable damages standards, and will go a long way in enhancing future innovation and productivity"⁶.

But what is "quality", how is it measured, and how does it apply to assessing portfolio value?

This study applies advanced linguistics and computer modeling of patent quality indices to objectively identify any meaningful changes in calculable indicators of patent quality, especially indices that may be considered under the new USPTO examination guidelines, and how those indices may correlate to decisions favoring the plaintiff and defendant in each case during the 6-1/2 months following the KSR, compared to CAFC decisions rendered throughout the preceding 2006 calendar year.

A large number of statistically significant changes in quality indices were identified in the patents of CAFC decisions reviewed. The author interprets the data, and highlights the most meaningful patent quality trends that could shape future corporate patent strategy, and provides data suggesting how KSR may influence future decisions of patent owners, attorneys and patent strategists as they develop, maintain and exploit patent assets to maximize shareholder value.

¹ *KSR International Co. v. Teleflex, Inc.*; <http://www.supremecourtus.gov/opinions/06pdf/04-1350.pdf>

² http://en.wikipedia.org/wiki/Inventive_step_and_non-obviousness#Teaching-suggestion-motivation_.28TSM.29_test

³ <http://www.uspto.gov/web/offices/com/sol/notices/72fr57526.pdf> Examination Guidelines for Determining Obviousness Under 35. U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*

⁴ Alan Thiele, San Antonio IP attorney, Court douses patent wildfire, May 1, 2007, Jon Van, Chicago Tribune

⁵ Lee Eulgen, Chicago IP attorney, Court douses patent wildfire, May 1, 2007, Jon Van, Chicago Tribune

⁶ BSA Statement Applauding Supreme Court Rulings on Patent-related Cases, April 30, 2007, Business Software Alliance (BSA) President and CEO Robert Holleyman

METHODOLOGY

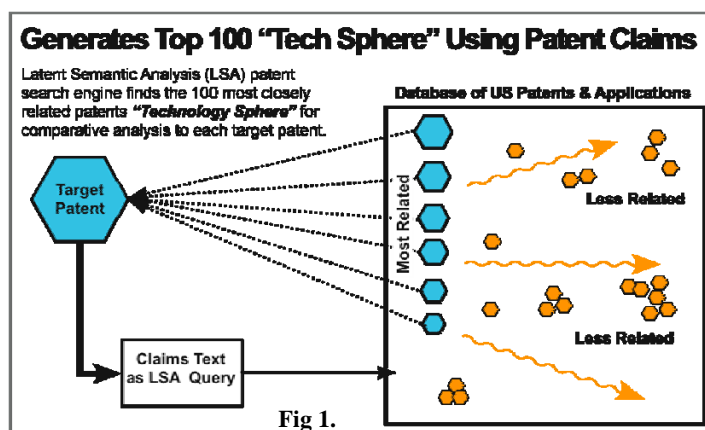
Initial data development involved the creation of sample patent collections by extracting 79 patent numbers from 52 relevant CAFC decisions rendered during calendar year 2006 (the last full year prior to KSR), and 38 patent numbers from 32 relevant decisions rendered between May 1, 2007 and November 15, 2007 (post-KSR).

Excluded from the study were decisions not based on the direct qualitative merits of the patent such as decisions related to inequitable conduct, failure to pay maintenance fees, and other procedural issues.

Each patent was grouped into one of four collections for analysis: 2006 / decided for the defendant; 2006 / decided for the plaintiff; Post-KSR / decided for the defendant; Post-KSR / decided for the plaintiff.

The patents were uploaded into the patent portfolio database of PatentCafe's web-based Portfolio-Xpert™ portfolio management software. The patent analysis software was first used to perform calculations on 35 indices that contribute to patent value⁷.

The qualitative analysis also used PatentCafe's Patent Factor Index™ (PFI)⁸ scoring algorithm that incorporates various regression models developed by leading economists and mathematicians over the past 20 years, along with computed qualitative comparisons using Latent Semantic Analysis (LSA)⁹, a natural language processing method that analyzes vectorial semantic relationships between highly relevant, closely related patents¹⁰.



Throughout this report, repeated reference to the “*Technology Sphere*” will be made. A critical component of this qualitative analysis was the ability to draw statistical comparisons to other patents that closely correlate to the technology domain of each patent being analyzed, the “target patent”. By using the full text of the claims of each target patent as a natural language search query performed on PatentCafe's LSA patent search engine, a group of 100 most closely related patents, determined as those with the highest semantic

relevancy rank, the “*Technology Sphere*”, were identified. A *Technology Sphere* was created for each patent reviewed, and was used for statistical comparison to each of the target patents throughout the study (Fig. 1).

LSA was used to identify the technology domain for each patent since it is the only patent search technology currently available that is capable of identifying patents disclosing “prior art that is in a field of endeavor other than that of the applicant, or solves a problem which is different from that which the applicant was trying to solve”¹¹, in accordance with

⁷ Portfolio-Xpert™ is PatentCafe's commercial software solution used by patent attorneys and IP managers for strategic analysis of patent portfolios. <http://www.patentcafe.com/library/brochures/portfolio-xpert.pdf>

⁸ Patent Pending: http://www.patentcafe.com/library/whitepapers/patent_factor_whitepaper.pdf

⁹ Landauer, T. K. & Dumais, S. T. (1997). A solution to Plato's problem: The Latent Semantic Analysis theory of the acquisition, induction, and representation of knowledge. *Psychological Review*, 104, 211-140

¹⁰ http://www.patentcafe.com/products/patent_search.asp

¹¹ <http://www.uspto.gov/web/offices/com/sol/notices/72fr57526.pdf>

the USPTO examination guidelines. LSA searches for prior art meeting the broadest interpretation of the claims by using the full text of the claims of the target patents as semantic search queries.

Qualitative characteristics of each patent within the four collections, as well as the collections as a whole, were examined to identify any correlations to win/loss, or pre/post KSR. These indices included (partial list): total patent quality score, legal quality score, commercial quality score, technology quality score, number of forward citations, number of backward citations, number of possible un-cited prior art patents, number of possible un-cited concurrent art patents, number of main US patent classifications within the *Technology Sphere*, number of unassigned patents within the *Technology Sphere* (as granted), number of same-owned patents within the *Technology Sphere* (as granted), number of US classifications of forward cited patents, semantic relevancy strength of subject patents related to the 100 Patent-Cluster, statistically determined claim scope and novelty, invalidity risk, probability of litigation avoidance, forward citation value, enforcement, combinatorial accession, partnering and licensing potential, patent competitive position, in-licensing (portfolio-building) potential, level of technology advancement, technology sophistication, technology cogency, and others¹².

In all, 117 patents from 84 cases were examined during the course of this study. Using LSA, the total number of patents used in the computer models, defining the technology domains for all 117 patents totaled 11,700.

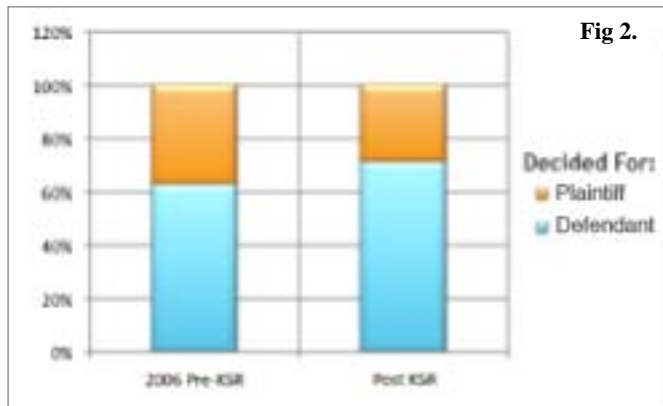
Approximately 409,500 data points were analyzed during the development of this study. In part, the data points consisted of raw counts on certain bibliographic fields such as the number of inventors, number of forward and backward citations, and filing dates. Additionally, data points computed during the processing of Patent Factor Index scores for each patent were analyzed, including: number of different classifications of forward citations, filing dates within the *Technology Sphere* (for each patent analyzed), relevancy rank of each target patent compared to the *Technology Sphere*, and the number of patents within the top 100 search results that are owned by the same applicant as the target patent.

¹² http://www.patentcafe.com/library/whitepapers/patentfactor_terms.pdf

FINDINGS

In the 2006 cases reviewed for this study, 63% of the decisions found for the defendant, 37% favored the plaintiff. In post-KSR cases, 71% of the decisions favored the defendant, while 29% found for the plaintiff. The 11% increase in post-KSR decisions favoring the defendant reflects, on average, an increase of patents being declared invalid in the post KSR court.

There was also an observed shift in the number of originally unassigned patents that found their way to the CAFC under a new assignee / owner.



In the 2006 cases, 18% of the patents in decisions favoring defendants, and 17% of the patents in decisions found for the plaintiffs were originally issued without a recorded assignee, and were assigned to a third party prior to, or during the litigation.

However, in post-KSR decisions, defendants in cases involving originally unassigned patents prevailed more often (22%) compared to decisions favoring the defendant in 2006 (18%).

Conversely, plaintiffs in post-KSR cases involving originally unassigned patents prevailed less often (9%) compared to plaintiffs asserting originally unassigned patents in 2006 (17%), a 47% drop from 2006.

It is likely that the new obviousness definition in the post-KSR environment¹³, in part, contributes to this shift toward more decisions favoring the defendant post-KSR, but computing “obviousness” was not within the scope of this analysis. The shift in decisions favoring defendants may simply reflect a more aggressive defense against assertions of patents

| | TOTAL SCORE | LEGAL | COMMER | TECH |
|----------------------------------|-------------|-------|--------|------|
| Decided For The Defendant | | | | |
| 2006 | 604 | 651 | 579 | 581 |
| Post KSR | 620 | 672 | 602 | 620 |
| Percent Change | 3% | 3% | 4% | 6% |
| Decided For The Plaintiff | | | | |
| 2006 | 601 | 622 | 567 | 614 |
| Post KSR | 614 | 679 | 614 | 705 |
| Percent Change | 2% | 8% | 8% | 13% |

Table 1.

acquired by owners for the primary purpose of enforcement. Overall, the raw and computed data does show increased scores in many key indicators of patent quality in post-KSR decisions.

Meaningful statistical patent analysis necessarily requires the review of many interrelated patent quality indicators. It is well known that “single score” patent analysis methods lack the resolution necessary to evaluate discrete quality metrics, and may obfuscate observation of key indices.

For example, to obtain a “single score”, the author computed “total average scores” (using a 0-1000 scale) of

¹³ "We begin by rejecting the rigid approach of the Court of Appeals. Throughout this Court's engagement with the question of obviousness, our cases have set forth an expansive and flexible approach inconsistent with the way the Court of Appeals applied its TSM test here." Supreme Court in KSR v. Teleflex, 550 U.S. ____ (2007)

the subject patents of the reviewed cases. The total average quality score for patents in decisions for the defendant was 604 during 2006, versus 620 for post-KSR cases (3% quality increase). Patents in 2006 decisions for the plaintiff scored 601 compared to 614 for post-KSR cases (2% quality increase).

The data shows that patents that found their way to the bench in the post-KSR era scored higher overall, but in many cases, the quality increase of key indices was statistically insignificant.

A clearer picture emerges as more detailed quality indicators are analyzed (Table 1.). Post-KSR patents generated higher average scores in every legal, commercial, and technology quality factor analyses.

It is not within the scope of this analysis to research possible causes for the increase in post-KSR patent quality.

However, analyzing the scores of 30 discrete indices contributing to the legal, commercial and technology averages in Table 1. does provide more insight on the patent quality metrics which positively correlate to the indicated shift in decisions in post-KSR cases.

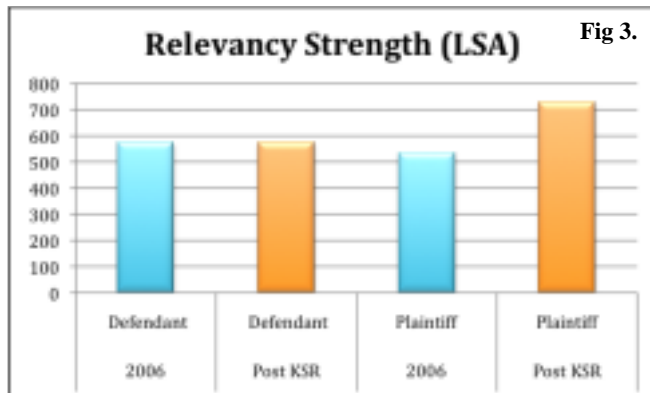
LEGAL FACTORS

PatentCafe's Patent Factor Index separately analyzes eight quality indices: Enforceability, Semantic Relevancy Strength, Novelty, Claim Scope, Prior Art Validity, Concurrent Art Validity, Sustainability in Opposition, and Litigation Avoidance. During this analysis, the pre/post KSR scores for enforceability (legal status), novelty¹⁴, and sustainability in opposition did not reflect a statistically significant change.

However, Relevancy Strength (a linguistic analysis comparing each patent to the 100 Patent-Cluster), Claim Scope, Validity Confidence (based on statistical Prior Art and Concurrent Art probability), and Litigation Avoidance showed considerable 2006 v. post-KSR differences.

Relevancy Strength

The sharpest increase in legal quality indices was seen in Relevancy Strength. Relevancy Strength analysis uses an LSA search query comprised of the full text of the claims of the patent being analyzed. The score is determined based on the ranking of the analyzed patent within the top 100 search results. As an example, a patent that ranks #1 receives a score of 1,000. When more patents in the search results rank higher than the patent being analyzed, the score drops.



Relevancy Strength for patents in cases decided for the defendant remained almost unchanged for 2006 versus post-KSR (near midpoint 575 v. 574 respectively). However, Relevancy Strength scores for patents in cases decided for the plaintiff moved up from 534 in 2006, to 727 in post-KSR decisions (up 27%).

The 727 score of patents favoring the plaintiff in post-KSR cases indicate that, on average, the specifications of the patents for which the plaintiff prevailed were more closely related to their respective claims than patents for

which the plaintiff prevailed in 200 cases.

Relevancy Strength also serves as a statistical test of how well a patent specification supports the patent claims¹⁵.

Plaintiffs prevailed more often in post-KSR cases with patents that scored significantly higher in Relevancy Strength when compared to Relevancy Strength scores of plaintiffs' patents during 2006.

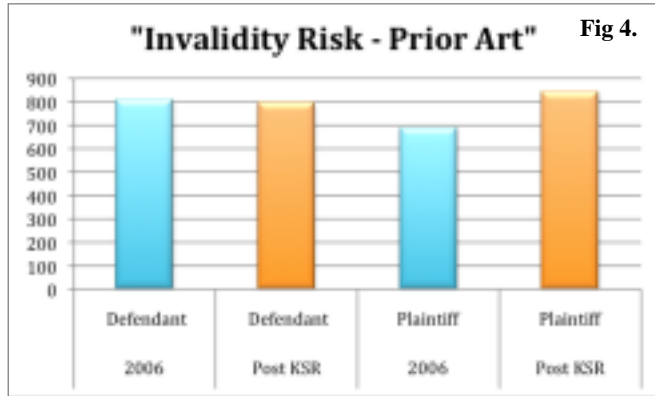
Invalidity Risk

Except for enforceability (legal status is active, with paid-up issuance and maintenance fees), patent validity is considered the single most important component of patent quality.

¹⁴ Reitzig, Markus. (Version: December 2003) What Do Patent Indicators Really Measure? – A Structural Test of 'Novelty' and 'Inventive Step' as Determinants of Patent Profitability.

¹⁵ 35 U.S.C. 112. http://www.uspto.gov/web/offices/pac/mpep/documents/appxl_35_U_S_C_112.htm

Although all granted patents carry the presumption of validity, **the post-KSR environment has retroactively cast new criteria challenging validity presumption.** Patent invalidity risk is therefore a key consideration prior to patent assertion, and more importantly, to the underlying quality of each patent overall.

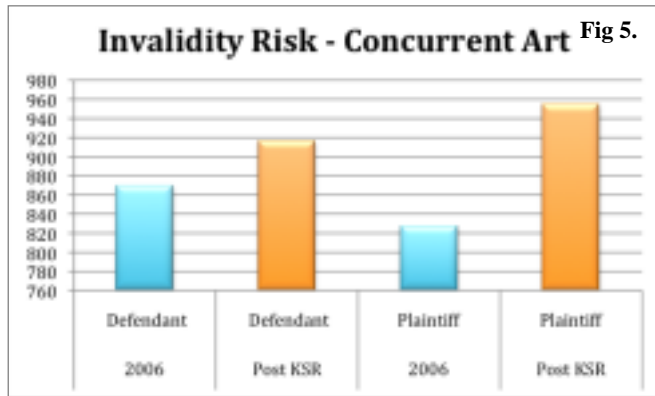


LSA relevancy ranking has proven to be a consistently reliable proxy for validity confidence.

PatentCafe's PFI quality scoring system takes the full text of the claims of each patent being investigated, automatically applies it as a Latent Semantic Analysis query to a US granted and published application database, and inserts the target patent within the search results – the *Technology Sphere* patents receiving the highest relevancy scores.

Using an analysis similar to the Relevancy Strength scoring above, the PFI compared the target patent score (where it appears within the search results relevant to its own claims) to all other earlier filed, higher ranking patents in the search results, and computes an invalidity risk score. The PFI analyzed both prior art and concurrent art (relevant patents co-pending during the target patent's prosecution that are not cited by, and do not cite the target patent).

On average, the Validity Scores increased for all patents decided in post-KSR cases (Figs. 4. & 5.).



In post-KSR cases in which defendants prevailed, the validity score average increased slightly (1.9%), with Prior Art scores of patents asserted against them actually falling (2%). This indication positively correlates successful defense to a decline in the validity of the asserted patent. The finding also suggests a negative correlation to post-KSR cases in which defendants prevailed against claims with higher validity confidence. More prior art was statistically identified using PFI validity scores, especially considering broader interpretation of the asserted claims following KSR.

The increase in validity confidence scores was more pronounced in decisions favoring the plaintiff. In post-KSR decisions, asserted patents were of significantly higher quality (15.5% increase in validity confidence scores) compared to cases decided for the plaintiff during 2006. Prior art validity confidence climbed 18%, and concurrent art validity confidence rose 13%.

In cases in which plaintiffs prevailed, the validity score average increased by 15.5%.

The increase in post-KSR validity scores point to a positive correlation between higher validity scores and successful assertion. The upward shift in validity scores in post-KSR cases may also suggest that statistical validity scoring of patents could be a secondary decision-support indicator that should be considered prior to assertion.

The current study did not explore the use of PFI validity scores as a predictor of future Court decisions.

Litigation Avoidance

It's been shown that the more frequently a patent is cited within three years of issuance compared to the most closely related patents, the more likely it is to be litigated during its life cycle¹⁶. Conversely, patents with no technical or commercial value will seldom be cited, or litigated, and will have higher litigation avoidance scores.



This suggests that patent owners that are competing in a valuable market segment will likely need to turn to litigation in order to protect revenue. On the other hand, competitors will invariably attempt to invalidate patents that protect what the competitors envision as financially lucrative markets.

Therefore, plaintiffs hoping to effectively enforce patents will look to those with a LOWER score (more contested patents / markets that are less likely to avoid litigation).

PFI analysis of Litigation Avoidance is initiated by using as an LSA search query the claims text of each target patent, and identifying the 100 Patent-Cluster, the “technology corpus”. An analysis is then performed comparing the forward citations on each target patent to their respective 100 most closely related patents.

In cases decided for the defendants, litigation avoidance for the asserted patents in 2006 was 575, compared to an average post-KSR score of 741, a significant increase (22%). The average score increase shows that the post-KSR patents were LESS likely to be litigated based on relative citation value of their most closely related patents (Fig. 6).

Cases involving patents with higher litigation avoidance scores showed LESS likelihood of being litigated, and were decided for the defendant.

Consistent with findings favoring the defendant, plaintiffs that prevailed in post-KSR cases did so with patents that earned lower scores than patents in the 2006 cases.

Cases involving patents with lower litigation avoidance scores showed HIGHER likelihood of being litigated, and were decided for the plaintiff.

As an indicator of patent quality, PFI scores suggest that patents more likely to be litigated are those that tend to be of a “pioneering nature”, are earlier filed within a technology corpus, may be of higher overall quality.

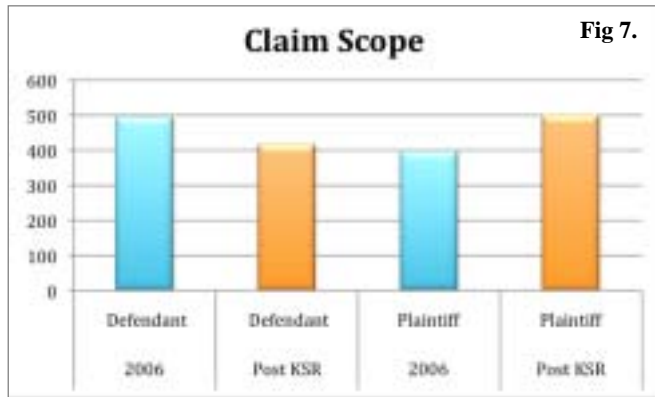
The Litigation Avoidance scores of the patents in post-KSR decisions analysis correlate positively to this PFI model.

¹⁶ Lanjouw, Jean O. and Schankerman, Mark (Revised March 2000) Characteristics of Patent Litigation: A Window on Competition.

Claim Scope

The traditional model of claims drafting has been to cast the broadest possible net of embodiments of an invention.

The question arises in a post-KSR environment whether drafting broad claims could have a contra effect of reach beyond the narrow focus of the invention, thereby opening the claims to challenges from industry or technology segments that have historically been considered “analogous art”. The reach into these analogous segments could trigger an obviousness issue leading to invalidity.



On the other hand, industry has traditionally considered tight, narrow claims easier to assert against specific infringement targets, and as a result, carrying a lower risk of invalidity.

Further, the Accelerated Examination Search Document¹⁷ outlines search requirements that “encompass all of the features of the claims, giving the claims the broadest reasonable interpretation”. LSA, which searches concepts rather than keywords, returns search results based on the broadest interpretation of

the text of the claims.

Another objective of this study was to determine whether LSA analysis of claim text could provide a data set against CAFC decisions in 2006 and post-KSR cases that could be of predictive value in assessing future CAFC decisions.

The defendants’ average claim scope scores of patents successfully defended in post-KSR decisions were lower than claim scope of patents in 2006 decisions: 417 in post-KSR versus 495 in 2006, (-19%). (Fig. 7.)

This drop in Claim Scope scores suggests that patents decided for the defendant in post-KSR cases cited more patent and non-patent references, and were therefore *narrower* than the claim scope of patents in decisions favoring defendants in 2006.

The change in Claim Scope score was significantly different for patents in cases decided for the plaintiff. The average claim scope scores of patents successfully prosecuted in post-KSR decisions were significantly higher than claim scope of patents in 2006 decisions: 500 in post-KSR versus 397 in 2006, (+21%).

The significant increase in Claim Scope scores for patents in post-KSR cases decided for the plaintiff suggests that broader claim scope may have contributed to the favorable decisions. Conversely, broader claim scope actually open more opportunity to defend against the claims by citing otherwise analogous technologies that may support an obviousness argument.

¹⁷ Changes to Practice for Petitions in Patent Applications To Make Special and for Accelerated Examination, <http://www.uspto.gov/web/offices/com/sol/notices/71fr36323.pdf>

Claims characteristics unaccounted for in this PFI analysis, and which could positively or negatively affect the summary conclusions include:

1. The number of patents within any particular technology or product area may be insufficient to identify a repeatable correlation between the quality of the analyzed patents and the case outcomes.
2. This study used only machine analysis, and did not incorporate any hand analysis of the opinions rendered for each case. Hand analysis that identifies individual claims at issue in each case could provide a higher quality control group of both LSA search queries, and subsequent results analysis.
3. Machine analysis of claim text did not consider claim type; the LSA search uses the full text of all claims of the target patent in order to comparatively analyze Claim Scope against the 100 most closely related patents. For instance, the full claims text in any given patent may include (a) an independent claim for an apparatus, (b) an independent claim for a method of business, (c) an independent claim for a process. The LSA search results using search query text that describes a combination of an apparatus, method, and process, may offer little predictive value for assessing future case outcomes.
4. Claim Scope scores are statistically lower for a target patent when the target patent has more backward citations (patent and non-patent references) than the 100 Patent-Cluster. However, the data is offset if the corresponding volume of claims of the target patent is also higher than the 100 Patent-Cluster. In these cases, the higher number of claims may correlate to a greater number of market opportunities as shaped by the high number of backward citations. These variations were not accounted for in this analysis.
5. Higher claim scope scores of patents in post-KSR cases favoring the plaintiff positively correlate to broader claim scope interpretation in view of KSR. Increasingly narrower scope of asserted claims (-12%) were found in post-KSR cases where defendants prevailed. Conversely, more broadly interpreted claims (+21%) were found more often in cases where plaintiffs prevailed (Fig. 7).

Because of these complexities related to Claim Scope analysis, the data is inconclusive, and no conclusions are presented with respect to Claim Scope as an indicator of patent quality in these CAFC cases. In a future research project, a more detailed study of individual claims of each target patent may provide the data to support a more predictive correlation between Claim Scope scores and post-KSR CAFC decisions.

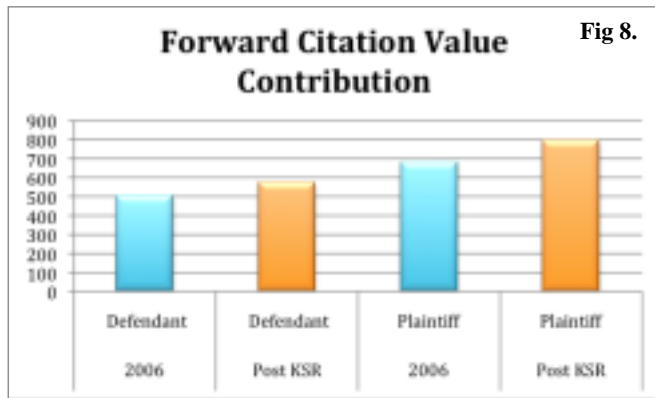
COMMERCIAL FACTORS

While a patent’s commercial factors are less likely to influence or correlate to CAFC decisions, they are nevertheless reliable indicators of the overall quality of a patent. Qualitative analysis of commercial indices are most useful in supporting decisions related to patent licensing, acquisition, portfolio acquisition or divestiture, damages calculations, and general commercial value of a patent, or entire portfolios, within any given market.

Of the 8 commercial quality metrics computed by PatentCafe’s Patent Factor Index analysis of these cases, the pre/post KSR scores for two indices, Backward Citation Value and Crowdedness, did not reflect a statistically significant change.

Forward Citation Value

Forward citations have long been used as a proxy for patent value¹⁸, but, it’s well known that examiner’s “pet citations” and self-citations routinely skew forward citation analyses, causing this metric to be an inconsistent and unreliable predictor of patent quality. However, forward citation value is nonetheless one of the commercial indices that, within the



context of total commercial value analysis, is scored in the PFI model (Fig. 8).

Average forward citations scores exceeding 500/1000 for target patents in the 2006 cases were determined to be important indices. Consistently, patents in 2006, as well as post-KSR cases decided for the plaintiff had higher forward citation value scores compared to patents in cases decided for the defendant. Post-KSR, the forward citation scores for patents in cases decided for the plaintiff and defendant increased 14% and 12%

respectively.

Overall, patents in cases decided after KSR were of higher commercial quality than patents in cases decided in 2006. Additional study is required to determine whether the statistically higher quality patents in post-KSR cases is a coincidental occurrence, or whether the higher bar to prevailing in CAFC cases influences parties to a litigation to settle more often when litigating lower quality patents, thereby leaving decisions on higher quality patents to the Courts.

Partnering Potential

The PFI analysis gives the broadest interpretation to the claims as a search query to identify the *Technology Sphere*. Patents in the top 100 search results can be comprised predominantly of patents within the same US classification as the target patent, but are most often comprised of patents granted across a wide and varied range of classifications.

¹⁸ Hall, Bronwyn H., Jaffe, Adam B. and Trajtenberg, Manuel. (2004). Market value and patent citations. JEL Classification: O31, O38 – 2004.

In the present study, the most significant gains in Partnering Potential were seen in patents from post-KSR cases decided for the plaintiff. Fig. 9. shows average Partnering Potential patent scores in post-KSR cases were 659, compared to 483 in 2006 cases (+27%).



Partnering Potential scores also increased in post-KSR cases decided for the defendant, from 655 in 2006 to 741, a 12% increase.

When the claims text of the target patent returns patents granted in classifications different from the target patent, the differently classified patents invariably teach what is claimed in the target patent, and the potential to license or assert the target patent in these peripheral technologies or market areas increases.

However, when patents from other classifications (different technology or market areas) read on the claims of the target patent, there is an inherent risk that the specifications of these peripheral patents may teach the invention of the target patent, leading to obviousness questions.

Litigating attorneys relying on keyword searching without the benefit of semantic analysis of claims text will not routinely discover patents outside of the main classifications of the target patent. Therefore, it's unlikely that arguments related to *obviousness* in the post-KSR cases relied on classification-agnostic analysis of related, but differently classified specifications.

A positive correlation of high value partnering potential to increased claims scope breadth was identified. As the average claim scope breadth of post-KSR patents increased, so too did the number of different patents classifications in the 100 Patent-Cluster, suggesting that broader claims captured patent specifications from peripheral technology areas.

The data shows that the highest rate of score increase in both broader Claim Scope and Partnering Potential favor the plaintiff in post-KSR decisions, however, these metrics may not be reliable predictive indices of future decisions since semantic analysis of the target patent claims by defendants may identify more patents supporting arguments in favor of obviousness. These arguments may lead the Court to determine invalidity more often, increasingly favoring the defendant.

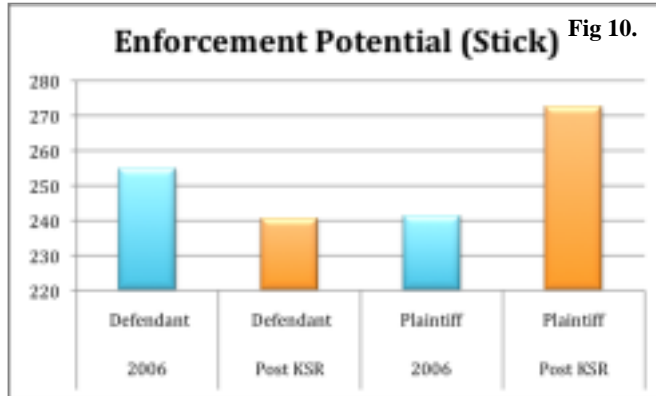
Patents with higher enforcement and opportunistic licensing potential correlate positively to higher patent value, pointing to patents that are more often litigated¹⁹. The PFI patent evaluation model uses Latent Semantic Analysis to statistically compute overall licensing potential.

Enforcement Potential

Enforcement Potential is the indicated ability to derive licensing revenue from larger patent owners, defined by the total number of same-owned patents by companies that share ownership of the *Technology Sphere*. Lower scores indicate that the ownership within the *Technology Sphere* is distributed across many owners (no dominant owner). Higher scores

¹⁹ Lanjouw, Jean O. and Schankerman, Mark (1998). Stylized Facts Of Patent Litigation: Value, Scope And Ownership. Department of Economics, London School of Economics and Political Science.

are realized when a smaller number of patent owners (potential licensees) each have made significant investments in product/market development, resulting in the ownership of a substantial number of the 100 Patent-Cluster. In other words, fewer companies dominate the technology segment.



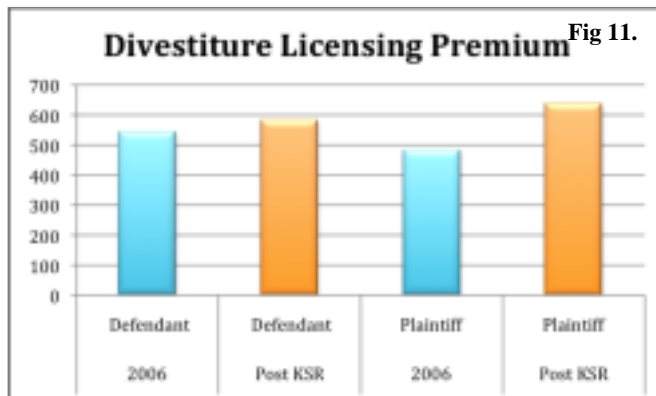
Average Enforcement Potential scores for patents in post-KSR cases decided for the defendant dropped to 241 when compared to the average 2006 score of 255 (-6%), positively correlating to lower plaintiff scores for Enforcement Potential, and increased frequency of decisions favoring the defendant. (Fig. 10.)

In cases where the CAFC decided in favor of the plaintiffs, post-KSR Enforcement Potential scores rose from 241 in 2006, to 273 in post-KSR cases (+11%)

- Successful post-KSR enforcement (prevailing at trial) by plaintiffs that dominated a technology segment correlated positively with patents scoring higher on Enforcement Potential.
- On average, post-KSR decisions favoring defendants increased as enforcement potential scores for asserted patents decreased (fewer plaintiffs dominated the technology segment as defined by the 100 Patent-Cluster).

Divestiture Licensing Premium

Divestiture Licensing Premium is defined as a synergistic value attributable to each patent owned by the assignee that also owns a group of patents that control a given market. After the LSA search using the claims of the target patent returns the 100 most closely related patents, the analysis assigns a score to the target patent correlating to the number



of patents within the *Technology Sphere* that are also owned by the same assignee (Fig. 11.).

- Post-KSR defendants prevailed more often when target patents earned lower Divestiture Licensing Premium scores (7%), compared to patents in the 2006 cases.
- Conversely, plaintiffs receiving favorable post-KSR rulings were enforcing target patents that earned significantly higher Divestiture Licensing Premium scores (24%) than patents enforced by successful plaintiffs in 2006.

In-licensing Opportunity

In-licensing Opportunity is a PFI index that scores a given patent based on the number of unassigned closely related patents that appear in the *Technology Sphere*, following an LSA search using the claims text of the target patent as a search query.

In-licensing Opportunity is a valuable metric for organizations seeking to quickly build portfolios in a given technology domain since the PFI identifies unassigned patents that (a) contribute to the portfolio composition to maximize value, and

(b) may be acquired as a discount from small entities that may have little interest in continuing long term maintenance fee investment in patents they may not currently be commercializing.

In cases decided for the plaintiff, a significant drop in In-Licensing Opportunity scores (-29%) was observed (Fig. 12.)



The availability of closely related but unassigned patents within the domain of the plaintiffs' patents diminished in post-KSR cases.

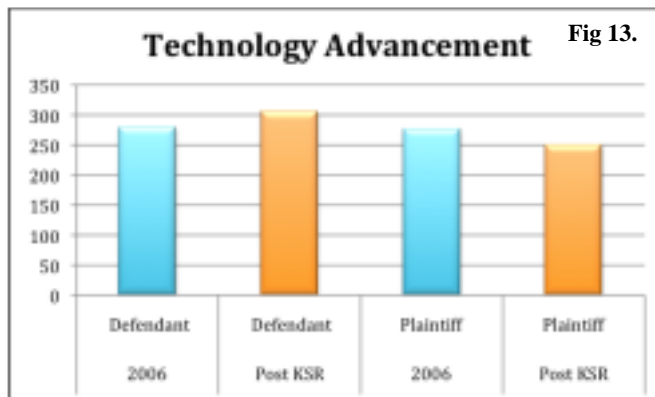
The post-KSR decline in In-Licensing Opportunity scores compared to In-licensing Scores of patents is cases decided during 2006 may be a strong indicator of a "land grab" of the highest quality, unassigned patents by companies attempting to build more robust portfolios for either defensive, or offensive purposes.

TECHNOLOGY FACTORS

PatentCafe's Patent Factor Index Report uses a variety of techniques to compute four technology quality factors. While some of these indices experienced statistically insignificant change between 2006 average scores, and post-KSR scores, a few of the indices did discover some early trends.

Technology Advancement

Technology Advancement appears to be the only significant technology factor that markedly changed between 2006 and post-KSR. However, small changes in other technology factors may be early indicators of emerging quality trends of patents litigated in a post-KSR environment.



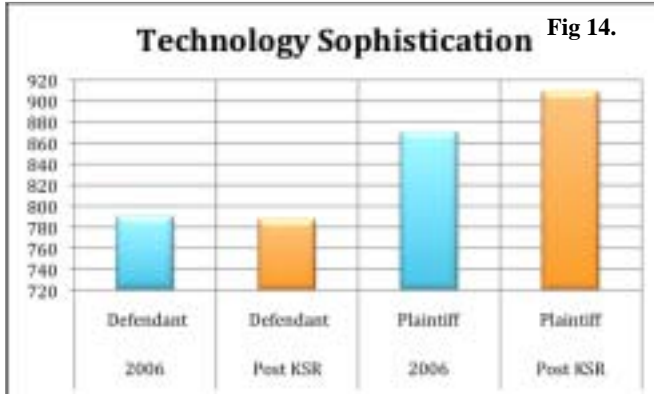
Technology Advancement scores heavily rely on the number of backward patent and non-patent literature citations as indicators of advancement over prior art. When compared to the 100 Patent-Cluster, a target patent containing a very large number of backward citations generally indicates a closer link between the target patent, and prior art, and a smaller increment of technology advancement (Fig. 13.).

With respect to the scores generated in cases decided for the defendant, fewer backward citations of post-KSR patents indicate that the target patent discloses more advanced technologies than in 2006 cases. The higher post-KSR scores could reflect patents more advanced (more distanced) from the alleged infringement, or patents with fewer references that reflect fewer limitations of the claims, both conditions that aid in the defense of an asserted patent.

More clearly, in cases decided for the plaintiff, the 10% drop in Technology Advancement scores in post-KSR patents positively correlates to the raised standard for non-obviousness. The larger number of backward citations, which result in lower scores, cause the applicant to more narrowly construe the scope of the claims of the invention. Narrower claim

scope increases the difficulty the accused party will encounter in trying to identify un-cited prior art that may invalidate the patent.

Technology Sophistication



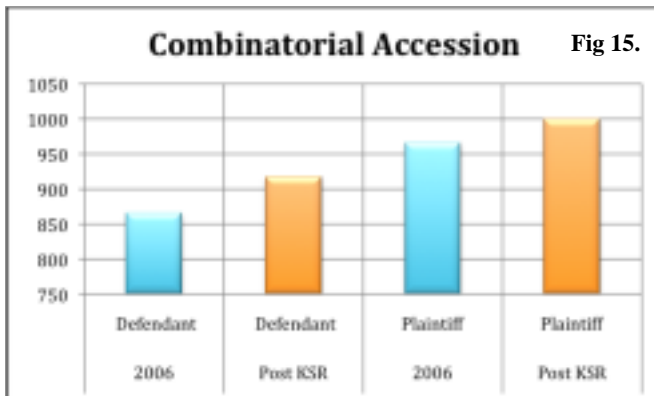
Technology Sophistication scores of all patents in all cases, regardless of rulings favoring the defendant or plaintiff within either the 2006 and post-KSR groups were quite high, closely ranging between 787 to 909 (Fig. 14).

Comparative forward citation analysis is a core component of the Technology Sophistication index. It was observed that the more heavily cited patents are being carried through to trial. These figures should be interpreted along with the Forward Citation scores.

Combinatorial Accession

Combinatorial Accession is defined as the diffusion of a particular technology across various industry or market segments – indicated by the number of closely related patents with US patent classifications that differ from the main classification of the target patent.

As an example, the Hewlett Packard invention of an ink jet printer nozzle for high resolution printing of photographs (US patent classification 347) preceded later patents in the fire extinguisher industry that claimed nozzle designs (US patent classification 159, 169, and 239) that performed nearly identical function – keeping the sprayed stream very narrow. The relationship between two inventions, that are in completely different patent classifications, could support obviousness arguments in light of KSR.



When a core technology such as the ink jet printer nozzle finds its way into different industries to solve similar problems, the value of the patent increases, and the “reach” of the technology into other non-obvious industries reveal new enforcement opportunities, as well as new invalidity risks.

Combinatorial Accession scores were exceedingly high across the board. However, in cases decided for the defendant, average post-KSR scores jumped 6% (Fig. 15). This nominal score increase may not signify the start of a trend, however, in light of KSR, the PFI analysis uses Latent Semantic Analysis to identify inventions in US patent classifications different from the target patent in an attempt to identify inventions that would be obvious to persons of ordinary skill (but in different industries, solving different problems).

A higher score correlates positively to a stronger defense by looking at non-obvious industry segments in which the technology of the target patent, alone or in combination with different inventions, may meet the KSR obviousness standard.

Technology Cogency

Technology Cogency is defined by the Patent Factor Index algorithm as the score for technology “strength” as primarily

defined by the number of named inventors on each patent. In other words, more inventors correlate to a “stronger” technology.

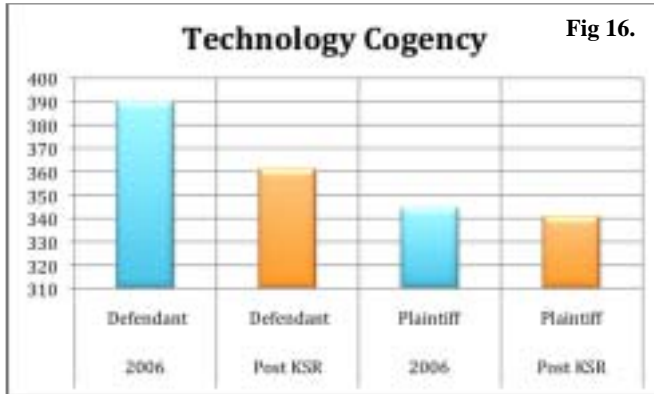


Fig 16.

As shown in Fig. 16., Technology Cogency was not found to be a significant factor in any of the cases examined. In post-KSR cases decided for the defendant however, a slight decrease in Technology cogency scores correlate positively to an increase in decisions in which defendants prevailed over patents claiming “weaker” technology.

Additional data points were also analyzed, but did not show significant changes between 2006 and Post-KSR. These data points, along with the tabulation of CAFC judges decisions, is provided in the following Table 2., and Table 3.

ADDITIONAL DATAPPOINTS AND JUDGES' RECORDS

Additional data points identified and/or used during the development of this study, but not analyzed as discrete indicators within the scope of CAFC decision analysis are shown in Table 3.

| Decided For: | Total Aggregate | Total Legal | Total Commercial | Total Technology | Fwd Cites | Back Cites | # Un-cited Prior Art | No Classes in Tech Sphere | Potential Licensees | Unassigned | Owned by Same Assignee | No Classes of Fwd Cites | # Inventors |
|--|-----------------|-------------|------------------|------------------|-----------|------------|----------------------|---------------------------|---------------------|------------|------------------------|-------------------------|-------------|
| Defendant (Patent Factor Index Scores Averaged) | | | | | | | | | | | | | |
| 2006 | 604 | 651 | 579 | 581 | 22 | 35 | 7 | 15 | 39 | 34 | 12 | 24 | 3 |
| Post KSR | 620 | 672 | 602 | 620 | 27 | 29 | 10 | 15 | 41 | 35 | 15 | 35 | 2 |
| <i>Percent Change</i> | 3% | 3% | 4% | 6% | 20% | (20%) | 27% | 0% | 4% | 1% | 18% | 30% | (22%) |
| Plaintiff (Patent Factor Index Scores Averaged) | | | | | | | | | | | | | |
| 2006 | 601 | 622 | 567 | 614 | 41 | 38 | 14 | 10 | 40 | 34 | 10 | 34 | 2 |
| Post KSR | 614 | 679 | 614 | 705 | 48 | 21 | 10 | 13 | 35 | 21 | 13 | 45 | 2 |
| <i>Percent Change</i> | 2% | 8% | 8% | 13% | 15% | (81%) | (47%) | 23% | (13%) | (59%) | 23% | 24% | 7% |

Table 2.

Judges' Record (Only the lead judge on each case is shown. The (concur / dissent) record of the second and third judges on each three-judge panel were not incorporated into the following table.

| Lead Judge | CAFC 2006 | | | Post KSR v. Teleflex | | |
|----------------|---------------------|-----------|---------------------|----------------------|-----------|---------------------|
| | Defendant | Plaintiff | Defendant Prevailed | Defendant | Plaintiff | Defendant Prevailed |
| Bryson | 3 | 0 | 100% | 0 | 1 | 0% |
| Gajarsa | 2 | 2 | 50% | 1 | 2 | 33% |
| Linn | 1 | 0 | 100% | 0 | 0 | 0% |
| Lourie | 10 | 4 | 71% | 1 | 5 | 17% |
| Mayer | 7 | 3 | 70% | 4 | 1 | 80% |
| Michel | 10 | 9 | 53% | 8 | 0 | 100% |
| Newman | 14 | 5 | 74% | 7 | 2 | 78% |
| Rader | 3 | 5 | 38% | 4 | 0 | 100% |
| Schall | 0 | 1 | 0% | 2 | 0 | 100% |
| Totals | 50 | 29 | 63% | 27 | 11 | 71% |
| | Total patents: 79 | | | Total patents: 38 | | |
| | Total decisions: 52 | | | Total decisions: 32 | | |

Table 3.

CONCLUSION

Computer modeling of homogeneous groups of patents appears to be effective in high-resolution identification of qualitative differences between the groups.

When applied to patents grouped by pre-established characteristics, such as CAFC decisions for defendants or plaintiffs over a specified timeline, Patent Factor Indices can effectively identify general trends in patent quality, and the correlation between quality and CAFC decisions. Patent Factor Indices further identified very significant patent quality changes in indices that may establish a trend.

The findings of this study show that overall quality of patents in CAFC decisions following KSR has increased, as illustrated by the high number of indices positively correlating to trends in CAFC decisions.

Overall, this analysis suggests an average increase in validity confidence scores of **all** patents finding their way to the CAFC. However, in the post-KSR environment, the data suggests that plaintiffs that prevailed overcame a significantly higher bar to validity confidence when compared to defendants searching for more prior art supporting invalidity.

Certain indices showed very significant changes in post-KSR decisions when compared to CAFC decisions in 2006. More specifically, computed scores showing very high positive correlation to CAFC decisions include:

- legal factors (computed claim scope, validity confidence, and probability of litigation avoidance),
- commercial factors (forward citation value contribution, enforcement licensing potential, divestiture licensing potential, and partnering potential), and
- technology factors (technology advancement and combinatorial accession)

This study showed a trend suggesting that these indices are becoming increasingly important as management decision-support data points when considering licensing, patenting, enforcement, or portfolio acquisition strategy.

While these index scores are the result of analysis of recent cases, all of which were being actively litigated prior to KSR, there is no assurance that the trend will continue.

KSR had little influence in directing which patents were adjudicated in the post-KSR environment, since all of the patents entered into litigation prior to the KSR decision. The Court's opinions however, were influenced by KSR, and although the cases were decided on merits of the case, the Court may have weighed differently certain qualitative measures in forming their decisions. An analysis of cases decided on patents entering into litigation after KSR will be required to prove or disprove the thesis of a positive correlation between patent quality and CAFC decisions.

KSR will likely influence what patents management relies upon in support of future infringement litigation, and what licensing or litigation strategy will be pursued in light of the changing post-KSR environment. A supplemental analysis should be performed at such time a sufficient number of decisions are rendered by the CAFC on cases that first entered litigation following KSR v Teleflex.

REFERENCES

CAFC DECISIONS

The following cases were used to identify the patents analyzed in this study.

Pre-KSR Cases (Jan 1, 2006 – Dec. 31, 2006)

Abbott Laboratories v. Andrx Pharmaceuticals, Teva
Abraxis Bioscience v. Mayne Pharma
Advanced Cardiovascular Systems v. Medtronic Vascular
AERO Products International, et al. v. INTEX Recreation
AGFA Corp. v. CREO Products, Inc., et al.
Akeva L.L.C. v. Adidas- Salomon AG, et al.
All Computers, Inc. v. Intel Corp.
Alza Corporation v. Mylan Laboratories
Amgen v. Hoechst Marion Roussel (known as Aventis)
Applied Medical Resources v. United States Surgical
Aventis Pharma S.A., et al. v. Amphastar Pharmaceuticals
Bicon, Inc, et al. v. The Straumann Company, et al.
Classified Cosmetics, Inc. v. Del Laboratories, Inc.
Competitive Techs. v. Fujitsu Ltd.
Cordis Corp. v. Boston Scientific
Curtiss-Wright Flow Control, Corp. v. Velan, Inc.
Dentsply International, et al. v. Hu-Friedy MFG. Co.
DSU Medical Corporation, et al. v. JMS Co., LTD, et al.
Eli Lilly v. Zenith Goldline
Eolas Technologies v. Microsoft Corp.
Exigent Technology, Inc. v. Atrana Solutions, Inc.
Fiber Optic Designs, Inc., et al. v. Seasonal Specialties
Flex-Rest, LLC v. Steelcase
Global Maintech Corp., et al. v. I/O Concepts, Inc.
Golden Blount, Inc. v. Robert H. Peterson, Co.
Honeywell International v. ITT Industries
Inpro II Licensing, S.A.R.L. v. T-Mobile USA, et al.
Kwik Products v. National Express, Inc., et al.
Lamps Plus, Inc, et al. v. Dolan, et al.
Lava Trading v. Sonic Trading Management, et al.
Liquid Dynamics Corp. v. Vaughan Company, Inc.
Louisville Bedding Company v. Pillowtex Corporation
Meade Instruments v. Yamcon
Minebea Co, LTD. v. Think Outside
Momentum Golf v. Swingrite Golf Corp.
Mstar Semiconductor, Inc. v. ITC, et al.
Ncube Corp. (now C-Cor, Inc.) v. Seachange Int'l
NPF, Ltd. v. Smart Parts, Inc.
O2 Micro International, Ltd. v. Monolithic Power Systems
Old Town Canoe Company v. Confluence Holdings Corp.
On Demand Machine Corp. v. Ingram Industries et al.
Pactive Corp. v. Dow Chemical Company
Pfizer, Inc. v. Ranbaxy Laboratories, Limited,

Phillips Electronics North America, et al. v. Contec, et al.
Planet Bingo, LLC, et al. v. Gametech International
Primos, Inc. v. Hunter's Specialties
Rogers v. Desa International
Safecllick, LLC v. Visa International Service Association
Semitool, Inc. v. Dynamic Micro Systems
Serio-Us Industries v. Plastic Recovery Technologies
Ventana Medical Systems v. Biogenex Laboratories
Xerox Corp. v. 3Com Corp., et al.

Post-KSR Cases (May 1, 2007 – Dec. 31, 2007)

ACCO Brands, Inc. v. ABA Locks Manufacturer Co.
Allvoice Computing PLC v. Nuance Communications
Automotive Technologies Int's vs BMW at al.
Aventis Pharma Deutschland GmbH v. Lupin, Ltd.
Biomedino, LLC v. Waters Technologies Corp.
BMC Resources, Inc. v. Paymentech
CIAS, Inc. v. Alliance Gaming Corp.
Daiichi Sankyo Co., Ltd. v. Apotex, Inc.
Data Encryption Corp v Microsoft
Entegris (known as Mykrolis) vs Pall Corporation
Festo Corp. v. Shoketsu Kinzoku KK
Frazier v. Layne Christensen Company
Furnace Brook, LLC v. Overstock.com
Gillespie v. Dywidag Systems International
Haberman v. Gerber Products Company
Honeywell vs Universal Avionics
Hutchins v. Zoll Medical Corp.
Hyperphrase Technologies v. Google
L.B. Plastics, Inc. v. Amerimax Home Products, Inc.
Leapfrog Enterprises v. Fisher-Price
Microstrategy Incorporated v. Business Objects Americas
Mitutoyo Crop. Vs Central Purchasing
Motionless Keyboard Company v. Microsoft Corporation
Paice vs Toyota
PharmaStem Therapeutics, Inc. v. ViaCell, Inc.
Phillips vs Iwasaki
SafeTCare Manufacturing Inc. v. Tele-Made, Inc.
Schwarz Pharma Inc. v. Paddock Laboratories, Inc.
Sinorgchem v. ITC & Flexsys America
Stumbo v. Eastman Outdoors
Takeda Chemical Industries v. Alphapharm PTY., LTD.
z4 Technologies, Inc. v. Microsoft Corp.

Referenced Patents

| Patents of Pre-KSR (2006 cases) | Patents of Pre-KSR (2006 cases) | Patents of Post KSR cases (2007) |
|--|--|---|
| 4,433,225 | 5,738,014 | 4,354,125 |
| 4,681,893 | 5,739,867 | 4,687,777 |
| 4,703,359 | 5,749,731 | 4,743,450 |
| 4,836,963 | 5,756,349 | 4,743,902 |
| 4,866,349 | 5,788,455 | 4,914,436 |
| 5,081,400 | 5,791,250 | 5,004,681 |
| 5,094,358 | 5,793,028 | 5,061,722 |
| 5,112,311 | 5,805,804 | 5,109,181 |
| 5,164,879 | 5,838,906 | 5,117,063 |
| 5,221,141 | 5,872,562 | 5,192,553 |
| 5,229,382 | 5,879,370 | 5,231,253 |
| 5,249,322 | 5,879,382 | 5,259,703 |
| 5,266,072 | 5,884,403 | 5,283,422 |
| 5,273,995 | 5,896,666 | 5,332,322 |
| 5,292,331 | 5,955,422 | 5,343,970 |
| 5,311,203 | 5,961,231 | 5,401,741 |
| 5,367,726 | 5,988,159 | 5,502,989 |
| 5,385,553 | 5,992,324 | 5,579,845 |
| 5,389,618 | 6,000,337 | 5,584,023 |
| 5,415,578 | 6,010,718 | 5,608,111 |
| 5,424,016 | 6,035,264 | 5,628,338 |
| 5,458,414 | 6,044,393 | 5,718,298 |
| 5,465,213 | 6,112,237 | 5,721,832 |
| 5,482,289 | 6,124,355 | 5,799,273 |
| 5,506,981 | 6,157,956 | 5,813,861 |
| 5,520,567 | 6,259,615 | 5,870,456 |
| 5,547,933 | 6,278,982 | 5,913,685 |
| 5,562,113 | 6,344,053 | 6,044,471 |
| 5,582,407 | 6,352,861 | 6,068,770 |
| 5,586,058 | 6,494,714 | 6,116,457 |
| 5,596,656 | 6,523,079 | 6,279,033 |
| 5,618,698 | 6,551,616 | 6,357,065 |
| 5,621,080 | 6,565,714 | 6,378,907 |
| 5,655,452 | 6,589,541 | 6,463,700 |
| 5,662,364 | 6,604,300 | 6,526,321 |
| 5,674,278 | 6,615,814 | 6,602,502 |
| 5,714,520 | 6,651,885 | 6,785,825 |
| 5,727,786 | 6,662,471 | 7,013,298 |
| 5,731,355 | 6,830,358 | |
| 5,731,356 | | |