

A Method for Assessing the Patent Landscape

Philip M. Anderson and Cherie Ann Sherman, Ramapo College of New Jersey

Abstract

From the early stages of an invention through to commercialization, it is prudent to assess the competitive patent landscape. Knowing the proprietary advantage of the competition is important in defining a new product's features and specifications. Too often this is ignored and the new product has to be redesigned because of infringement. While it is preferable to engage a patent attorney to make such evaluation, this is not always possible due to the financial limitations of the inventor. As an alternative, we present a simple method of categorizing patents, which the inventor may largely undertake on his or her own. The data produced by applying the method can be incorporated in table form into a business plan.

Introduction

When deciding whether or not to enter the marketplace for a specific product type, determining what the potential profitability for an invention might be, or attempting to evaluate the worth of a company for potential acquisition, it is useful to understand the relevant patent landscape. Questions worthy of answers are: Is the sector already saturated with products of various kinds? Is the invention likely to be a real innovation in the field? Are there customers who need for this type of product? Are the patents listed among the target company's assets really worth what they say they are? Do these patents fit within my company's vision?

Although there are financial methods of valuing patents, such as discounting future cash flows from licensing, a broader evaluation method is useful, especially one that goes beyond a mere financial evaluation (Pitkethly 1997). Accordingly, the authors propose a new method for assessing the patent landscape, which identifies the detriment to innovation that each already existing patent in the inventive sector poses. The method employs seven categories ranging from no effect on patentability to complete blockage of innovation. Placing each of the existing patents in one of the categories generates a numeric evaluation of the patent landscape and provides an estimate of the difficulty of introducing a new invention in the sector as well as the relative worth of the existing patents.

A major concern in developing the categorization method is the need to find a technique that can be easily communicated. Potentially, members of the board of directors lacking technical backgrounds, research and development personnel who might not have a financial orientation, and accountants and attorneys are all involved in evaluating the value of patents. Therefore, the method categorizes patents into a limited number of categories given catchy keyword titles that can be instantly grasped, as shown in Table 1.

Rank	Mnemonic	Description
6	Fort Knox	Blocks entry - cannot be overcome
5	Fortress	Major obstacle to entry - costly to overcome
4	Hedgerow	Blocks specific embodiments - can be circumvented
3	Picket Fence	Narrow or questionable invention - easily circumvented
2	Speed Bump	No problem - very narrow or questionable invention
1	Expired	Public domain
0	Red Herring	Not Relevant - special application of the technology or different technology

Table 1. Patent Categorization Method

Limiting the method to seven categories, each paired with a familiar visual image or well-known phrase, facilitates learning and ease of discussion. For example, category 3, Picket Fence, generates an image in the reader's mind of an obstacle with numerous openings, and is therefore easily gotten around.

Going through the method can help students think about what's important in assessing the state of the relevant technology and its impact on whether or not to develop a new product. Descriptive category names enable student entrepreneurs to communicate with angel investors and explain why their invention is unique from the prior technology and has a place in the market.

The categorization method is inherently flexible, being applicable to any area of invention or type of invention. The broadness of scope of the invention being pursued determines the category into which existing patents will be placed. For example, if the goal is to patent a glue trap for mice (a relatively narrow invention), an example of a Fort Knox Patent (FKP) would be the first patent filed or the seminal patent for that specific type of mouse trap, as this would preclude patentability for any trap using the glue method. (To be patentable, an invention must be novel and not obvious, meaning there must be some amount of difference from what has already been patented 35 USC §101, §102.) If the goal is broader, such as to produce any sort of working mouse trap, a patent for a glue trap would not be an impediment to patentability, as many types of mouse traps are possible. In this situation, the patent for the glue trap would, instead, fall into category 4, Hedgerow Patent (HP), as it can be circumvented. Simply using another entrapment method, such as a spring locking mechanism, would avoid infringing on a patent for a glue trap.

To understand the true nature of an invention, it is necessary to read the claims portion of the patent. This is a complex undertaking as the first claim for patent number 2,717,437, Velvet type patent and method of producing same shows:

A method for producing a velvet type fabric consisting in weaving together a plurality of weft threads and a plurality of warp threads together with a plurality of auxiliary warp threads of synthetic resin material, forming loops with said auxiliary warp threads on one surface of the so woven fabric, submitting the said loops to a thermal source, thereby causing said loops to retain their shape to form raised pile threads, cutting said loops near their outer ends, thereby forming material-engaging means on at least a portion of said pile threads constituted by said cut loops.

This claim is from the seminal patent for the Velcro® brand fastener but few would recognize it (De Mestral 1955).

To provide a more complete explanation of the method of categorization, let us assume that the Velcro® brand fastener has recently been invented and we are interested in producing a new kind of competing fastener using similar technology. In this case, the Velcro® patent (an FKP) would describe a fastener having two or more separate parts, one part having hooks and the other part having loops, such that the loops cling to the hooks and fastening occurs, when the parts of the fastener are pressed together. Both parts of the fastener have adhesive on their non-joining sides, so they can be affixed to the objects to be joined by the fastener. As long as one wishes to produce or market an invention using this same technology, it will be necessary to obtain a license from the owner of the FKP to avoid a lawsuit for infringing the patent. There is no way of getting around the patent claims as they are broad and describe the invention without any limiting characteristics, which could be easily modified without affecting the function of the invention.

An example Fortress Patent (FP) would claim the same type of invention but with an additional requirement, such as pressure sensitive adhesive. The additional requirement provides an opportunity for the new invention to differentiate itself by using a heat sensitive adhesive for example. It might be costly to research and develop this new adhesive, but it provides the possibility to design around the FP and, hence, produce the new invention legally or both patent and produce it.

The remaining categories, 2: Speed Bump, 3: Picket Fence, and 4: Hedgerow, are a bit more problematic and require finer degrees of comparison and more knowledge of the inventive fields. Again, the inventor or technical personnel might be interviewed to make these assessments or provided with the patents for more detailed examination.

An example Hedgerow Patent (HP) would describe the same invention as the FKP and FP but would also add some new limitations—for example, specific materials to be used. An HP might require a pressure sensitive adhesive having a specific composition or nylon hooks and loops or steel hooks and loops. A Picket Fence Patent (PFP) could require a specific alternate composition for the adhesive (say a stickier adhesive or an adhesive that is effective over a greater temperature range) for which there would be a simple substitute. A Speed Bump Patent (SBP) would be even more specific and require as an example that one or more parts of the fastener be specially shaped as disks or squares. The HP, FP, and PFP, due to their specificities or claim narrowing, all provide ways for the new invention to enter the market place by differentiating itself from what has already been invented, without losing its functionality.

Once a patent has expired, all of the technology it employs can be freely used. US patents filed after June 8, 1995 expire twenty years from their filing date with the USPTO and US patents filed prior to June 8, 1995 generally expire seventeen years from the date of issue (35 U.S.C. § 154(c)). Patents can take as much as three years from application to issuance so this provision ensures about seventeen years of monopoly (Pressman 2006). Although expiration opens the field to new inventions, which use the public domain technology, the concomitant effect is that the ability to block competition using the technology is no longer an option. Patents in Category 1, Expired have no value but may affect category placement of related patents. For example, one ramification might be that a related patent is easy to copy because much of its technology is in the public domain.

Many patents, which appear to be related based on their patent classification or title may, in fact, be totally unrelated. For example, Alexander Graham Bell's patent, 174,465, for the telephone, is entitled, "Improvement in electric telegraphy" yet is has nothing to do with telegraphics (1877). A quick look at a

patent drawing or even perusing the patent's abstract may also reveal the lack of relevancy. The inventor or technical personnel would likely be best able to identify patents that fall into the category Red Herring Patent (RHP). A patent in this category might sound similar to the new invention, but in actuality describe something very different and therefore pose no obstacle at all. A type of fastener designed specifically to fasten a necktie might be one example because it has a very limited use, which does not overlap with the new invention, Velcro®. RHPs are not uncommon because patents often have titles that are not clearly related to what they do and even the drawings, which are required for every patent, may not clearly show how an invention works. It is necessary to read the claims portion of the patent to understand the true nature of the invention.

Procedure for Applying the Method

The steps in applying this method are as follows:

- Define the product or innovation to be investigated.
- Search literature and internet for similar products.
- Search for relevant patents.
- Identify a seminal patent, if one exists, and determine whether it is a FKP or FP type.
- Sort the patents by type.
- Analyze claims and categorize the patents.

A primary goal in using the method is to place the patents in question in their proper categories. This goal cannot usually be accomplished in an ad hoc, unstructured manner unless the technology is very simple and the person using the method not only understands the technology very well but is also familiar with the existing patents and the products that employ the already patented technology. One way to begin categorizing the existing patents is by identifying a seminal patent in the field, if in fact there is one. A seminal patent generally refers to the very first patented invention of its type, generally of great novelty. Examples of seminal patents are: Velcro® brand fasteners, the zipper, barbed wire, the automobile engine, and the Polaroid camera (Wherry 1995).

Searching

To find the seminal patent, one can begin with the free websites for patent searching as shown below in Table 2. Of these, the US Patent and Trademark Office (USPTO) database consistently provides the most reliable results (White 2008). One drawback of the USPTO database is that the drawings are in TIFF format, which requires downloading a separate reader and only permits downloading one drawing at a time. There are useful software programs such as Patent Grabber (<http://www.blazingdawn.com>) that facilitate the downloading of documents from the USPTO website. Also, another difficulty is that patents which were issued prior to 1976 are in image format and hence not text-searchable. Fee-based services may cover non-US patents, patents prior to 1976 in text-searchable form, patent drawings in a variety of formats, patent applications, analysis of search results, download of multiple patents simultaneously, and uninterrupted, speedy access. Several popular choices for patent searching appear below with pros and cons.

Organization	URL	Cost	Features
USPTO	ustpo.gov	free	Drawings in TIFF form, prints pages only one at a time
Google	google.com	free	Drawings in JPEG format. Entire patent in PDF
Patents.com	patents.com	free	PDFs
Patent Lens	patentlens.com	free	US and Foreign. Full Text, PDF.
FreePatentsOnline	freepatentsonline.com	free	Batch export to Excel

Table 2. Websites for Locating Patents

Citations to the seminal patent

If the patent searcher is not knowledgeable about the field of the invention, keyword searching of the patent database will not be an efficient way to identify a seminal patent, as there may be hundreds of relevant patents. A more effective way would be to identify the number of references to the patent in the literature of the field. Logically, if there is great interest in a patent, over time, it probably is one of major importance. Therefore, a retrieval count of a Google search using, for example, “patent 4,510,489” (commas are not necessary) is another way of developing this information. Better yet, the USPTO website provides a more focused method of generating the same type of information. Every patent has a REF field that links to all the other later patents which cite it. So, a patent search for any given patent number in the Referenced By field will retrieve all patents citing the patent. Also, if a searcher finds a patent of interest and would like to see later patents that cite it, clicking on the ‘Referenced By’ link automatically retrieves those patents.

Once a seminal patent has been identified, it should be immediately evaluated for Fort Knox patent (FKP) status. It may be that the field will not be open to the new invention or will not be open until the patent expires in twenty years from the date it was filed. The FKP may literally eliminate every single invention of its type, depending on how the patent was written. Alternatively, there may be some way of designing around the FKP, which must be factored into the new invention to eliminate infringement. The scope of the FKP can only be determined by analysis of the claims, which constitute a section of the issued patent, and this generally requires the assistance of a patent attorney, patent agent, or an individual with related experience.

If there is no FKP, but there is a seminal patent with some difference from the new invention, the seminal patent should be placed in category 5: Fortress. The Fortress Patent (FP) provides a base for discovering and categorizing the remaining patents because they must necessarily refer to the FP. According to the patent law, 37 CFR §1.56, every inventor has a duty to disclose the information the inventor knew and used in developing his or her invention. This information is referred to as the “prior art.” Hence, a citation to the FP should appear in the issued US patents of all related inventions, in the “References cited” section. By searching the patents that reference the Fortress patent, one may well uncover almost all the other relevant patents.

Claim analysis

Another means for identifying a Fortress Patent is by examining its claims. Claims form a picture of the invention using words, and under the patent law must disclose its inventive features and its method of operation known as the “best mode” (35 U.S.C. §112). An FP will generally have broad claims, meaning almost everything about the seminal invention is deemed to be new by the USPTO. To understand the difference between a broad and a narrow claim, the following examples from Pressman’s *Patent it Yourself* may help (2002, 9/26):

- 1) All eye-care professionals

- 2) The persons of Claim 1 who are medical doctors
- 3) The persons of Claim 2 who are strabismologists living in the City of Belvedere

The claims are increasingly narrower as they become more specific. By reciting specific elements of an invention in a claim, the inventor limits him or herself to ownership of only an invention including every one of the named elements. So, if your invention is a chair and you list four supports in your claims, the inventor of a three-legged stool is free to make, use and sell his chair, as it will not infringe on what you have claimed. Later inventions, which build off the FP, will have more narrow claims, which only describe differences from the FP and only allow the later inventors to market an invention with these differences.

Patent classification

Still another approach to gathering related patents would be to perform a patent classification search using the class numbers of the FP. The USPTO has a classification scheme for inventions similar to the classification schemes used by libraries to order books. An example of a class/subclass number would be 340/572.1, which pertains to tags used on electronic surveillance systems. (Class 340 pertains to electrical communications and subclass 572.1 pertains to a detectable device on a protected article.) Every patent lists at least one class number and generally subclass numbers as well, which more specifically describe the nature of the invention. A classification search on the USPTO website should retrieve the patents that describe inventions solving the same problem as the FP, and many of these will be relevant.

Drawings

Still another way to proceed is to examine the drawing of the FP, particularly if it is a device, and compare this drawing to the drawings of the related patents retrieved. According to the patent law 37 CFR §1.83, each and every novel element of a patented invention must be shown in the drawings, so a comparison with the FP is a quick way of determining the differences of the related inventions and the degree of their novelty.

Assignee

Ownership of the FP may also help uncover related patents. In the US today, the majority of patented inventions are assigned to corporations (Modlin and Glenn 2006). According to US patent law 35 U.S.C. § 261, assignments must be recorded with the USPTO if the assignee wishes to take any sort of action on the patent, such as responding to an office action from the USPTO. The assignee's name appears on the issued patent and is searchable in the Assignee field.

With the average cost of procuring a patent approaching \$10,000 and continuing to rise, few independent inventors can afford to proceed through the patenting process on their own. Most patents are granted to corporations and most inventors are employed by corporations (Giblin and DeMatteis 2003). Once a corporation has achieved some success with a patent, the corporation will generally seek to create a "thicket" of related patents, which differ from the FP in minor ways, as well as copyright and trademark rights in the inventive field, with the hope of discouraging competitors (Shapiro 2001). Therefore, a search on the assignee of the FP may uncover a wealth of patents in the same general area of invention.

An Application of the Method to Anti-Theft Systems

We will now describe how this method was used to evaluate the patent landscape for a possible new product entry into the field of electronic article control systems (EAS), and more specifically, EAS using acoustomagnetic technology. EAS is a general class of products that include retail antitheft systems and tags. The systems create a surveillance area around a retail store's exits. Tags, disposable and permanent, are attached to products for sale and detected upon exit unless removed or deactivated. A transmitter sends a radio frequency signal in pulses, which affects the tag attached to merchandise when it is in the

surveillance zone. When the pulse ends, the tag continues to emit a single frequency signal like a tuning fork for a short time, which can be detected by a receiver. A microcomputer checks the tag signal detected by the receiver and if it is at the correct frequency, synchronization rate, repetition rate, and level that indicate a tag that has not been deactivated by the cashier, an alarm sounds .

US Patent 4,510,489, issued in 1985, is the seminal patent in the field, as determined by the first author of this article, who was also the first inventor on the patent. A search of Google for “patent 4,510,489” yielded 2,860 hits. The USPTO search for the patent showed that 185 other patents referenced it.

Using 2004 data, 350 patents were identified and reviewed and 231 were deemed relevant enough for further review. Following a more in-depth review of this group, 166 patents were identified as relevant and classified in categories 1 through 6. The remaining patents were given the rank of 0. A number of the patents exceed 40 pages and 80 claims.

The patents were also divided according to the claim type: systems, tags (construction, composition and manufacture), accessory devices, and other (not relevant or non-EAS application of the technology). The distribution is shown in Figure 1. This sorting was necessary to highlight where the potential problems to market entry might lie

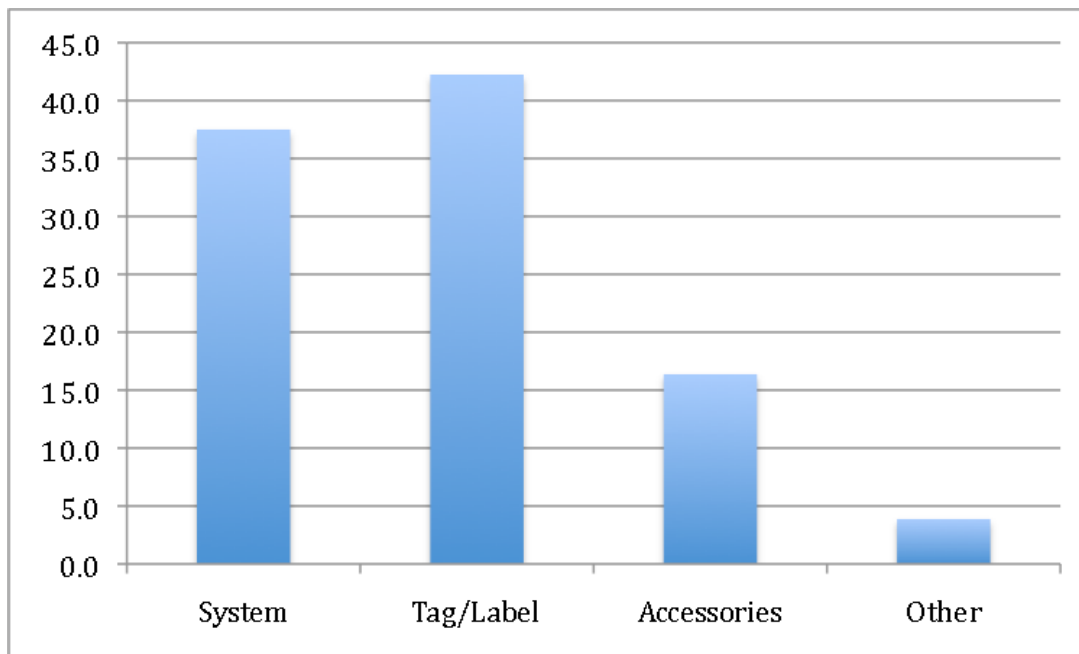


Figure 1. Percentage of Patents By Type

It took considerable effort (the better part of a week) to identify the patents, analyze the claims, and identify a category for each patent. Selecting the category required a degree of judgment. Some patents spanned multiple claim types and were put in the category most emphasized by the patent. Below, we describe the rationale for placing each of the identified patents in a category, in accordance with the method.

- Fort Knox: US Patent 4,510,489. This seminal patent was identified through knowledge of the field. This patent has since expired.
- Fortress: US Patent 4,510,490. The innovation described in this patent is a new manner of coding tags to be placed on products. The FP differs from the FKP because it contains coded tags. Coded

tags are uniquely identifiable while typical antitheft tags, as described in the FKP, are all alike. This patent has since expired.

- Hedgerow: US Patent 4,510,490. The innovation described in this patent is an improvement of the operation of the system through specialized antenna design. This patent stops only EAS with this specific antenna design. Other antenna designs, including the original design, remain viable alternatives. Had this not provided a significant increase in performance, this patent would have been placed in a lower category.
- Picket Fence: US Patent 5,729,200. The innovation provides for an alternate method of deactivating a tag. It does not prevent entry into the field because it describes one of many ways of deactivation.
- Speed Bump: US Patent 6,281,796: The innovation provides for combining tag deactivation with bar code reading. This is a combination that has already appeared in other inventions. Accordingly, the patent could very well be challenged.
- Expired: No expired patents were discovered. If this study were currently undertaken, the top ranked two patents would have expired and would fall into this category.
- Red Herring: US Patent 5,349,332. The innovation provides for operation at a variety of frequencies (frequency hopping), which is a completely distinct method from that used in the FKP.

Figure 2 shows the distribution of the 231 patents categorized. As one would expect, most of the patents landed in the middle of the category continuum and there were a large number of Red Herring patents. While the process revealed two patents in the top category that were about to expire, the large number of hedgerow patents indicated it would be difficult to enter the market using the acoustomagnetic technology. This would not preclude using a different technology to enter the market, but the acoustomagnetic technology has very strong performance advantages over other technologies. Entering the market using another technology would require an additional study.

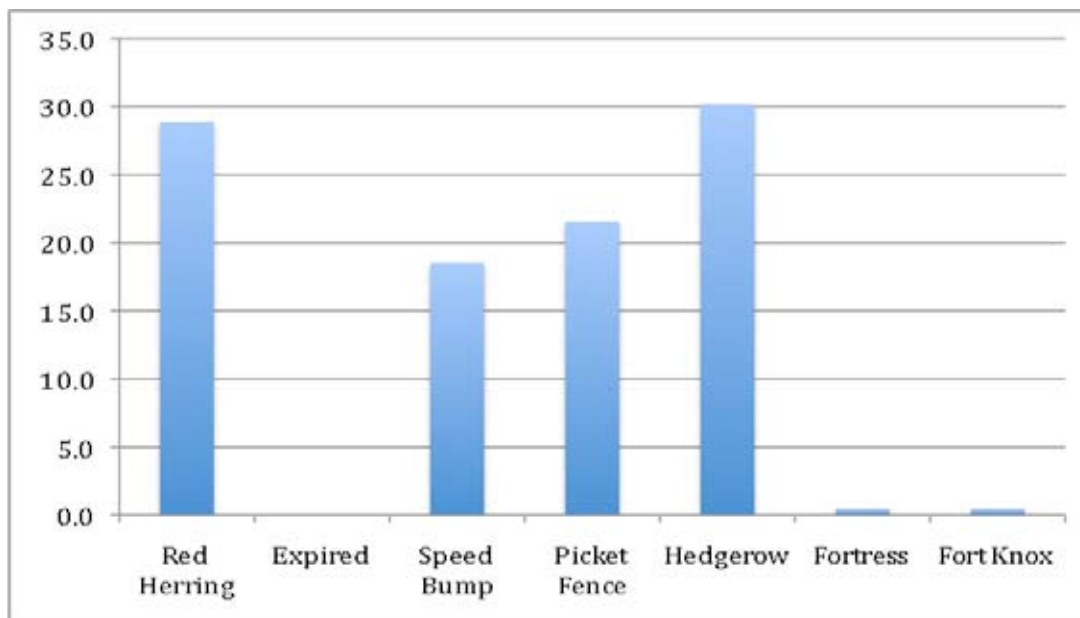


Figure 2. Percentage of Patents By Category

Conclusions

It can take a considerable amount of time to understand a complicated patent landscape, but the present method of categorizing patents can bring organization and simplicity to this difficult task. The method can help students think about what's important in assessing the state of the relevant technology and its impact on whether or not to develop a new product. Moreover, potentially, the descriptive category names will enable student entrepreneurs to communicate with angel investors and explain why their invention is unique from the prior technology and has a place in the market.

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