

Patenting Issues in Software Industry

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The paper discusses the issues related to software patenting and their implications for software industry. It explains the importance of intellectual property protection for software. Presents the salient features of the ongoing global debate on whether software patents can accelerate or hamper the process of innovations in software industry. Tries to draw a view based on the arguments given by two schools of thought and recent trends in software industries for some of the countries favouring and granting software patents. In the last gives India's stand on software patenting. It concludes by discussing the consequences of strong software patenting system for India followed by the conclusions.

During the early days of computer industry, the software came integrated with hardware. The issue of intellectual property remained confined to hardware only. All this changed during the sixties when software was unbundled from hardware. This gave rise to independent software vendors (ISVs) and the production of standard and custom operating systems, as well as independent applications softwares. Rapid diffusion of low-cost desktop or personnel computer (PC) in late seventies and eighties opened up huge opportunities for ISVs. The software industry gradually increased in terms of overall trade, production and consumption. In 1990s, the widespread

diffusion of the Internet created new channels for low-cost distribution and marketing of packaged software, reducing the barriers to entry into the packaged software industry. It also expanded the possibilities for rapid penetration of markets by packaged software products. This rapid increase in consumption of software and easy penetration of market through Internet resulted in increased software piracy, creating a big market in pirated software¹. According to estimates the global rate of piracy was 37% in the year 2000 that means out of the total software sold worldwide 37% was fake². Piracy causes huge losses of revenues to software companies every year.

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This has made the issue of intellectual property protection for software all the more important. The software is a complex product, which has given rise to a totally different kind of industry in which the input and the output consist of intangibles. The ownership of intellectual property in software industry influences the returns to investments, and the market structure. How best to protect and regulate ownership of intellectual property? The issue of software patenting has thus attracted considerable attention and debate.

The objective of this paper is to highlight issues related to software patenting and their implications for software industry. In the ongoing debate on whether software patents are useful or harmful for software industry, two schools of thought have emerged—one favours software patents while the other does not. First, the arguments against software patents are considered. This is followed by the arguments favouring software patenting. A third view is drawn, based on the two sets of arguments. The Indian scenario is briefed upon in the last followed by the conclusion.

IPR Protection in Software

The protection under IPR refers to protection of software through copyright, trade secret and patent.

Copyright protects the written expression of an idea presented in the form of literary works and books. Since software being a collection of written computer programs representing an expression of an underlying idea the copyright protection was extended to it as

such. In copyright law, the original software is automatically covered by copyright as soon as it is written and saved on a storage media. The copyright only protects the expression and not the underlying idea of the software. It protects against unauthorized copying of software's source code (human readable form of a software), object code (machine readable form of the software) and documentation³. One major advantage of copyright is that it provides a fine balance between monopoly and free circulation of an idea. It is also cheaper and easier to obtain than a patent. The disadvantage is that it does not protect the functionality of the software, which is of key importance. The software is a dynamic product whose functional aspects are different from other art and literary works. Experienced programmers can easily circumvent the copyright protection of the software by copying its functionality but not directly copying the code⁴. Sometimes it also becomes difficult to distinguish between idea and expression.

Trade secret protection is achieved by distributing software in "machine code", virtually indecipherable translation of programming language that computer reads. It is extremely difficult for another programmer to glean from a machine-code program the original steps written by the software's author. By withholding the source code, companies keep secret not only a particular technique, but also the way in which they have combined dozens of techniques to produce complete software. Trade secret is lost when another party discovers it independently or somehow it becomes public

knowledge. Trade secret does not prohibit the purchaser of the product to discover the source code behind the software. So if the person who has bought the product has the capability to disassemble the program through reverse engineering then trade secret can be cracked.

A patent is granted to an invention if it is new, non-obvious and industrially useful. The patent protection is achieved by filing a claim in the concerned patent office to achieve the exclusive rights of making, using and selling particular software product for a period of 20 years from the date of filing. Patent provides a more effective way when it comes to protecting the idea or functionality of software. In case of patents, everybody knows the precise boundary of the patented software because of the claims laid down by the patentee. Further, patents do not allow protection for independently created similar works⁴. Therefore, the demand for patent protection rights over software has increased.

Against Software Patenting

In the global debate whether the software patents are useful or harmful for the growth of software industry, different views have emerged. Organizations like Free Software Foundations (FSF) and League for Programming Freedom (LPF) have raised their voice against software patenting. The key arguments against software patenting are given below:

1. In principle, the patents are granted with a view to encouraging innovations in an industry. According to proponents of free software, this condition does not apply to software industry. Computer software is an ever-enduring product. Unlike other industrial products that wear out with time, fully debugged software performs its function without requiring maintenance or modification. So, software product can be sold to a particular customer at the most once. If it is to be sold to that customer again, it must be enhanced with new features and functionality and any software company that does not produce new and innovative products will simply run out of customers in due course of time. This will keep software industry an innovating industry even in absence of the patenting system⁵.
2. Patenting system may discourage young, independent programmers from adopting new ideas for further innovations because of the patents granted on combinations of algorithms and techniques that produce a particular feature in a software. These programmers have been the chief source of inspiration for software industry. There have been many instances where patenting system has backfired in software industry. One such example was the idea of public key encryption, which was patented in the US. Until its expiry in 1997, it largely blocked the use of public key encryption in the US. A number of softwares, which people started to develop, got crushed—they were never really available because the

patent holders threatened the programmers who tried to develop software based on public key encryption. Even though there might be different ways of describing one idea, which might be patented. In a given software, there are possibly several specific functionalities that are points of vulnerability which might be patented. Software developers shall find it difficult to incorporate them into a new software due to fear of infringements or complexity of obtaining licences from those who already have patents for those specific functionalities. Another example is the data compression software, which was written in 1984. At that time, there was no patent on the LZW compression algorithm, which was the underlying algorithm in the software. In 1985, the US Patent Office issued a patent on this algorithm and over the next few years, those who distributed the data compression software started getting threats of being sued in the court⁶. In a similar kind of case, Apple was sued because its HyperCard program allegedly violated patent number 4,736,308, which covered a specific technique that entails scrolling through a database displaying selected parts of each line of text. Separately, the scrolling and display functions are ubiquitous fixtures of software but combining them without a licence from the holder of patent 4,736,308 made it apparently illegal⁷.

3. In software industry “doing it right” rather than “doing it” first or “doing it” differently achieves success. It is the better implementation of already existing ideas, which makes a product unique and useful, e.g. Borland did not invent compilers. Microsoft did not invent operating systems. Novell did not invent networking. Sun did not invent Unix. Apple did not invent the graphical user interface. Oracle did not invent the database. All of these represent successful companies in their respective fields. Software patenting may allow companies to monopolize new technologies that may pose a danger to the very essence of the software industry's business philosophy⁵.
4. There are many difficulties in dealing with software related patents. Some of these are described below:

Complex Nature of Software

Software is a very complex product because it is free from many real world constraints, which limit the complexity in most of industrial products. For example, in case of sophisticated consumer goods such as video cameras, there may be at the most 1000 components. A product may thus involve components covered by just a few patents. A major computer program could comprise anywhere from 100,000 to 10 million lines of code. In the software industry, a product could contain thousands of inventions, any of which might be

patented. Moreover, it is also hard to classify the underlying components in software. There is a likelihood of explosion of potential patent coverage, which is likely to make it difficult to know with certainty about what is patented and what is not.

Difficulty in Searching for Prior Art

The literature of computer science is unbelievably large. It not only contains the academic journals, but also user manuals, published source code, and popular accounts in magazines for computer enthusiasts. A team of chemists working at a university might produce 20 or 30 pages of published material per year, a single programmer might easily produce a hundred times that much. The situation becomes even more complex in the case of patented combinations of algorithms and techniques. Programmers often publish new algorithms and techniques, but they almost never publish new ways of combining old ones. Although individual algorithms and techniques have been combined in many different ways in the past, there is no good way to establish that history. This is likely to make prior art search an impossible task.

Rapid Evolution of Software Products

Software products evolve very fast and with microprocessors speed doubling in every two years or even in lesser time. This rapid qualitative

change in the nature of software is likely to continue. A patent is assigned for 20 years. This system of patents may be alright for conventional industries, which typically produce a new generation of products every ten to twenty years. This may not be so for software industry where the rate of product generational change is higher than conventional industries. The existence of patents on software for such a long period might make it difficult to develop new products, which in turn may retard the rate of growth of software industry as a whole⁵.

5. Patenting system may retard the growth of open source software . In open source software, the human readable source code of the software is distributed along with the software product. The commercial software companies keep the source code of their products under tight secrecy and control, thereby maintaining a monopoly on improving their software by adding features or fixing bugs. This increases the cost to the customer. Any upgradation of the software becomes expensive because there are no competitors. This results in undue dependence on proprietary software, huge expenditure on licensing fee, growth of gray market in pirated software, and discourages innovation in the software industry at global level. Open source software being available with the

source code is free from these restrictions. User can customize it according to the local needs. This software also comes almost free of cost. Because of these two reasons open source software, for example, Linux, has become so popular that it is posing a credible challenge to commercial software vendors. And that is precisely where the danger lies. Increasingly, the commercial software vendors tend to use their patent portfolios as a competitive weapon, specifically, to keep new competitors out of markets.

Exposing the open source software movement to further risk is the development of new graphical user interfaces and desktop environments for Linux and other open source operating systems. Examples are the K Desktop Environment (KDE) and GNOME. These desktop environments are needed to make Linux more user-friendly and easy-to-learn. KDE and GNOME provide a user-friendly graphical environment reminiscent of Microsoft Windows or the Macintosh interface. They offer software development environments that enable application developers to create new open source software rapidly. Software developed in this way has the same, user-friendly qualities that the desktop environments offer. However, software patents protect many of the algorithms used to create graphical interfaces.

Several broad patents have been granted on the elements of graphical interfaces that it is all but impossible to develop a KDE or GNOME application

without potentially infringing on one or more patents⁸.

In Support of Patenting

There is another school of thought, which feels that granting of patents to software will help industry to grow. The key arguments in support of their claim are given below:

1. A patent rewards the investment of time, money and efforts put in by the researcher in his endeavours and stimulates further research by encouraging the competition as the rivals try to invent alternatives to the patented inventions.
2. Patenting system allows companies to recover their research and development cost during the period of exclusive rights so that they can further invest in research⁹. As per IBM's annual report in 2001, the company's intellectual property portfolio generated US\$1.5 billion in licensing royalties. The company was awarded a record 3,411 patents in the year 2001 by the United States Patents and Trade Marks Office¹⁰.
3. It can provide a level playing field to small and medium enterprises against larger software firms in the global software market by protecting their intellectual property. In 1994, Microsoft was asked by a California Court to pay \$120 million to Stac Electronics (a small software company), for allegedly using its data compression program¹¹.

4. Strong IPR protection through patents will make software industry even more attractive for investments by venture capitalists. More and more venture capitalists check whether the company they are going to finance, has its core technology patented or not.
5. Strong patenting system will help curbing software piracy, which results in huge losses of revenues to software companies every year.

Impact on Software Industry

While the debate on software patenting is still open, several countries grant software related patents. The interpretations for granting patents vary from the technical requirement that software be attached to hardware to the requirement of only functionality of software. USA leads in grants of software patents that may be pure abstract on later grounds³. A look on the software industries in countries like USA, Israel, Ireland and China that favour software patenting may be worthwhile. Table 1 gives the growth in terms of exports and revenues generated by the software industry in these countries. In US software industry contributed a trade surplus. In case of Israel, strong patenting regime has increased investor's faith in the industry, thereby, increasing foreign direct investment (FDI). For Ireland, strong IPR protection for software through patents is one of the main reasons for attracting FDI and helping the industry to grow. Patenting has encouraged Irish software companies to invest in development of software related

intellectual property. In case of China, although the industry has shown positive trends of growth, it has suffered a disadvantage because of weak implementation of IPR laws and high software piracy. The director of business advisory services at the US-China business council has explicitly issued a warning to foreign firms to keep critically important intellectual property away from China because of weak implementation of IPR laws¹⁰.

Consequences for Indian Software Industry

The Government of India has clarified its position on software patenting through the Patents (Second) Amendment Bill, passed by the Parliament in the budget session of 2002. It stipulates that a generic computer program using a simple calculation or algorithm or business process cannot be patented. But patents can be granted if software solves a technical problem in an innovative way¹⁹. This means software algorithms *per se* are not patentable. However, it is essential to keep a close watch in terms of consequences for software industry.

Indian software and services industry has become an important segment of country's economy. It accounts for 16% of country's total exports, for 5,00,000 jobs and over \$1.5 billion in investments¹⁶. But in order to maintain growth and competitive edge it has to concentrate on development of software products along with services. So far the bulk of Indian software exports has consisted of software services in which intellectual property protection is not a

Table 1—Impact of software patenting on industry

Country	Position on software patents	Recent trends in software industry
USA	<ul style="list-style-type: none"> Granting software patents vigorously 	<ul style="list-style-type: none"> During 1994-2000, the software industry has grown at an average growth rate of 15.4% faster than the GDP growth rate of entire economy of 5.4.¹² In 1997, the software industry contributed trade surplus of \$13 billion reducing the overall trade deficit by 36%.¹²
Israel	<ul style="list-style-type: none"> Favours software patents Amended patent law in 1995 enabling patent protection for software^(13a) 	<ul style="list-style-type: none"> Software export during 1997-2000 grew from US\$ 1 billion in 1997 to US\$ 2.5 billion in 2000.^{13b} In 1999, Israel was third largest recipient of venture capital funds in the world: \$276 million, on account of strong IPR protection for software through patents.
Ireland	<ul style="list-style-type: none"> Favours software patents Acceded to European Patent Convention as of 1998^{14a} 	<ul style="list-style-type: none"> Revenue generated during 1996-2000 grew from 5682 million Ireland pounds to 10150 million Ireland pounds in 2000^{14b}. Software export during 1996-2000 grew from 5436 million Ireland pounds to 8500 million Ireland pounds in 2000^{14b}. The bulk of Irish companies build their business around a product rather than services. Main reason of their success lies in the investment in the development of intellectual property^{14b}
China	<ul style="list-style-type: none"> Inventions involving use of computers are patentable^{15a} 	<ul style="list-style-type: none"> Total software sales were 17.6 billion RMB Yuan in 1999 which grew to 28.5 billion RMB Yuan in 2001^{15b}.

Table 2—Software export profiles of India and its competitors in the mid 1990s²⁰ (%)

Country	Proportion of exports in each category		
	Software services (excluding data entry)	Software packages	Data entry
India	90	5	5
Ireland	65	21	14
Mexico	53	32	15
Philippines	39	20	41
Singapore	25	58	17
China	17	56	27
Israel	19	76	5

major concern. India is still lagging behind many other countries when it comes to providing innovative software packages (Table 2). One possible reason for this may be absence of effective patenting regime for software. Strong

patenting system could have motivated Indian companies for development of innovative software products. Keeping in view the general shift towards strong patent protection for software in the industrialized world, a stronger patenting

regime for software might further increase India's contribution to the global software industry. At present, barely one-tenth of the computer software produced in India is actually registered and credited to this country on account of inadequate protection of intellectual property rights¹⁷. It is estimated that as much as eight per cent of global software is being created in India. A strong patenting portfolio would make the Indian software industry attractive for foreign direct investment, funding and venture capital that will promote commercialization¹⁸.

India's small and medium-sized software companies could also benefit from patenting system by reaping their benefits through licensing patents to big multinational corporations. This would help the vibrant domestic market to grow, which at present is lagging behind other developed countries. In fact, lack of patents makes it easier for bigger corporations to copy ideas from the software developed by small and independent software companies.

Indian software industry strongly favours software patenting. The National Association for Software and Service Companies (NASSCOM) has suggested that the framework for safeguarding the intellectual property must focus on protecting the functionality of the software. This should also be in conformity of the dynamics of the software industry. For this purpose the facilities at four branch offices of the patent office should be strengthened to help examiners in carrying out effective prior art search. Examiner's manuals giving clear-cut guidelines for software

patents should be prepared by the patent office. These manuals should also be made available for common public. Patent legislations of the countries, which have introduced software patenting earlier than India, should also be studied. USA for example has recently started giving patents on 'business methods'. It has also passed 'First Inventor Defence Act 1999' to protect prior users of 'business methods'.

Conclusions

Many salient features of software industry are highlighted in the ongoing debate on applicability of patenting system to software. The industry has its own economics, business philosophy and dynamics. Product evolution process and distribution channels are also different from other industries so is the cost involved in research, development and production. All these aspects need in-depth examination before a proper application of patenting mechanism. The policy for providing protection to the intellectual property in software should continually be reviewed at critical points so as to sustain the innovation process and growth in the software industry.

References:

- 1 Graham J H Stuart, Mowery David C, Intellectual Property Protection in US Software Industry, Paper presented at STEP Board Conference on "The Operation of the Patent System", http://www7.nationalacademies.org/step/Mowery_et_al_paper.doc 2001.
- 2 Iwata Edward, Software Piracy Takes Toll on Global Scale, USA Today, Tech Reviews. <http://www.usatoday.com/life/cyber/tech/review/2001-08-01-software-piracy.htm>

- 3 Gupta V K, Managing software protection, *Journal of Intellectual Property Rights*, **6**, 2001, 277-285.
- 4 Kumar Avinash , In the Matter of According Legal Protection to Intellectual Property Rights in Softwares: Options for Policy (Directorate of Extramural Research & Intellectual Property Rights, Defence Research & Development Organization) 2000, 4-43.
- 5 Irlam Gordon, Williams Ross, Software Patents: An Industry at Risk, League for Programming Freedom, <http://lpf.ai.mit.edu/Patents/industry-at-risk.html>, 1994.
- 6 Stallman Richard, Danger of Software Patents (Speech at Cambridge University) <http://lpf.ai.mit.edu/Patents/Danger-of-software-patents.txt> , 2001.
- 7 Garfinkel Simson L, Stallman Richard M., Kapor Mitchell, Why Patents are bad for software (From Issues in Science and Technology) <http://www.programming-freedom.org/links/prep.ai.mitedu/issues.article>, 1991.
- 8 Pfaffenburger Bryan, Open source software and software patents: A constitutional perspective, *Knowledge, Technology & Policy*, **12**(3) 1999, 94-112.
- 9 Hefter Laurence R and Litowitz Robert D, What is intellectual property. <http://usinfo.state.gov/products/pubs/intelprp>
- 10 Team D Q (2002). Industry analysis: Intellectual property, *Dataquest*, **20** 2002, 193-195.
- 11 Patents and Software Industry (Department of Trade and Industry) <http://www.dti.gov.uk/cii/docs/psi.pdf>
- 12 Economic Study released by Business Software Alliance, Washington, USA. <http://www.bsa.org/usa/press/newsreleases/1999-06-15.283.phtml>
- 13a Information Technology Landscape in Israel: Legal Environment. <http://www.americal.edu/carmel/nk3791a/legal.htm>
- 13b Israel High Tech and Investment Report, Israel India Report, <http://www.ishitech.co.il/0702ar7.htm>
- 14a Software related Patents: European Patent Convention, <http://www.jurisdiction.com/epc.htm>
- 14b Software Industry Statistics for 1991-2000, <http://www.nsd.ie/hm/ssii/stat.htm>
- 15a Comparison of Patenting Software Practice, <http://www.slwk.com/av/asia.pdf>
- 15b Chinese Centre for Industrial Development (CCID) Consulting, ccidconsulting.com
- 16 Karnik Kiran, Poised for Full Flight, *Data Quest*, **20**, 2002, 28-30.
- 17 Asia Pacific Network information Centre (APNIC), Weak IPR Laws TRIPS cos' Growth, <http://www.apnic.net/mailling-lists/s-asia-it/archive/1999/09/msg00068.html>
- 18 Confederation of Indian Industry(CII)News Press Releases, Patenting Could Make Indian Software Industry Attractive for FDI, http://www.ciionline.org/NEWS/pressrel/2000/Dec/27Dec_2.htm.2000.
- 19 Popat Tanvi (May 2002), WTO Digest, [http://www.tata.com/0_economic/wto/20020614wto\(1\).htm](http://www.tata.com/0_economic/wto/20020614wto(1).htm)
- 20 Chakraborty Chandana, Jayachandran C, Software Sector: Trends and Constraints, *Economic and Political Weekly*, Aug 2001, 3255-3261.