INNOVATION AND INTELLECTUAL PROPERTY MANAGEMENT - INTEGRATIVE APPROACH FOR COMPETITIVENESS

ABSTRACT

With development of science and technology, the world has seen shifts in economy from farming to industry to knowledge. To protect this knowledge, intellectual property (IP) regimes are evolved. It is not just IP generation that helps in growth and development but its efficient management also determines its role for wealth creation and well being of the society. IP management requires expertise in law, technology and management. Many organizations especially organizations from developing countries face IP management issue due to lack of availability of expertise in the domain. There are various IP management audit models available but they are either sector specific or IP specific and lack holistic approach. Hence there is a need of holistic IP management approach and IP management audit model which will help IP and technology managers to handle IP management without much involvement of IP experts. This paper introduces an IP management (IPM) audit model which is easy to implement and does not require any specific IP expertise. The study adopted qualitative and exploratory research methodology. Type 3 case study method and data triangulation are followed. The focus of the research is limited to 8 types of IP. The proposed model with systematic categorization of IPM activities focuses on reducing the complexity of the IPM system (IPMS) of an organization. The validation of the proposed IPM audit model confirmed potential IP identification and helped to reveal the gaps in the current IPMS of an organization. This IP model will be useful to IP and technology managers to map the current IP management practices and improve the IPM system based on it. The research is limited to electrical engineering sector. Although the study can be expanded further for other sectors.

KEY WORDS

Intellectual property management, Intellectual property management system, Intellectual property management audit model

1. Introduction

IP has been emerged as a strategic corporate asset and a critical value driver in the knowledge economy. Intellectual property management (IPM) is a multifaceted discipline, and involves five key responsibilities as IP generation, portfolio management, IP valuation, competitive assessment and strategic decision. IPM is a challenge faced mainly by technology and IP managers. IPM basically deals with the policy formulation followed by designing the strategies for acquiring, protecting and exploiting

the technology developed. IPM deals with intangible assets (IA) which are difficult to identify and manage, and requires expertise in technology, IP and law with visionary outlook. Therefore, managing IP is very critical. Many organizations have realized the need to integrate IP with business strategy. One of the ways to strengthen the IPM system (IPMS) of organization is to evaluate the IPMS, and then implement the necessary changes to build up the IPMS. This can be achieved through IPM audit.

IPM audit can have two dimensions: a process audit and a performance audit. A process audit focuses on such questions as whether the individual processes necessary for IP generation, protection, and exploitation are in place, and the degree to which the best practice is used and implemented effectively. Performance audit focuses on the outcomes of each individual core and enabling process and of the overall process of IPM audit and the impact of this on competitiveness.

Dow Chemical was the first organization which conducted its first organization-wide IPM audit in 1994 and saved USD 50 million in taxes and maintenance fees on unneeded patents, and earnings in licensing revenues, skyrocketed from USD 25 million to more than USD 125 million (Rivette and Kline, 2000). Honeywell International uses a separate company Honeywell Intellectual Properties Inc, to manage its IP portfolio. Honeywell, in 2000, received record award of USD127 million for damages from Minolta for technology (WIPO, 2008). Considering these few examples and statutory requirement of auditing IP, self-assessment IPM audit model is clearly the need for organizations.

2. LITERATURE REVIEW

In the knowledge dominated economy, IP occupies a significant position. The field of IP has evolved considerably over the last 20 years. The importance of traditional tangible assets such as land, labor, capital is reducing and IA such as knowledge, information, creativity and inventiveness are receiving more attention. IP has made its way in accounting books of an organization. On the accounting front, two accounting standards, Federal Accounting Standards Board (FASB) 141 and 142, were introduced in the USA. These standards require all companies with USA Generally Accepted Accounting Principles (GAAP) requirements to identify and value their IP, and to include those valuations on their balance sheets to provide investors with greater certainty regarding the value of those corporations.

According to Litschka et. al. (2006), IA are classified as human, organizational and codified assets. Sullivan has suggested classification of intellectual capital (IC) of firm as human assets and IA (Sullivan, 2000). According to this, IP are the subset of IA. In law, IP refers to a legal entitlement, which sometimes attaches to the expressed form of an idea, or to some other intangible subject matter. IP are

one of the IAs. Almost all IPs can be enforced through the law. IPs is the commercial application of innovation and creativity for improving and enriching lives at both the practical and cultural levels. Table 1 shares the IP asset percentages for various companies.

Table 1: IP asset percentage of various companies

Company	Market capitalization ($ billions)	Net tangibles ($ billions)	Intangibles ($ billions)	Intangibles to market capitalization (percent)
Coca-Cola	151	7	144	95
Kellogg's	10	0.5	9.5	95
IBM	149	12	137	92
Pfizer	14	1.3	12.7	91
Disney	52	5	47	90
American Express	72	8	64	89
Microsoft	392	47	345	88
Telstra	69	8	61	88
Exxon	301	74	227	75
Nike	11	3	8	72

(Source –WIPO, 2003)

In recognition of the impact of IP on the strategic, financial, and competitive aspects of business, IPM is developing a role in business strategy, and is receiving due credit. IP strategy is determined by competitive environment, technology position, and size and maturity of business. Corporate executives are becoming more aware about IP and their ownership to avoid any financial loss, which may arise due to mismanagement of IP. Various corporations have created diverse roles such as IP director, knowledge manager, information scientist, and so on, to address the IPM responsibilities. Organizations are allocating parts of their budgets to IP portfolio development.

2.1 Intellectual property management

The accumulation of knowledge is the driving force behind economic growth. IC is an outcome of knowledge management, and it has been defined as the difference between a firm's market value and the cost of replacing its assets. It is one of those things on which we cannot put a price tag (Bontis et al 1996). The key role of IPM is to identify the untagged ambiguous IPs, and competently utilize it.

Technology and IC allows one to do more with less. A typical innovation cycle starts with investment in R&D to generate knowledge e.g., new technologies and know-how. This knowledge when codified e.g. patent, copyright, industrial design, trademark; later convert into cash-flows. This appropriation of IP

assets may be realized through different possibilities. If a company has the manufacturing capability and marketing network, it will commercially exploit IP in the subsequent steps in the process creating its value.

IPM is becoming a major element in corporate business management. IP managers help to accumulate hefty corporate IP asset portfolios for use in mergers and acquisitions, joint ventures, cooperative R&D agreements, and licensing agreements; in much the same way as product managers help to build up product portfolios. IP asset portfolios are developed strategically, targeting cluster areas based on product and technology markets, and cross-licensing opportunities. Companies are forging alliances with each other in order to raise the value of their IP assets, and to obtain mutually beneficial competitive advantages through cross licensing. Often such alliances will provide substantially increased clout to the involved companies in their particular field of technology, or enable them to support technological standards in their particular field (WIPO, 2008). Many studies have suggested that a healthy IP system is one of the key elements in encouraging foreign direct investment (FDI) (WIPO, 2008). Indeed, when a company suffers a material loss due to insufficient attention given to the IP assets management, it is conceivable that corporate officers and directors could face potential liability for a breach of their fiduciary duties.

IPMS is defined as a policy and managerial tool that helps in accumulating and ensuring the value of rich IP portfolio. The core aspect of IPMS lies in identifying ‘essential’ and ‘applicable’ IPs based on technology and IP landscape analysis. The two major functions of IPM are creation and extraction of 1) Portfolio as protective view; and 2) Portfolio as business assets view. Sullivan (2000) had developed a framework for commercial decision process, which shows integration of innovation, IP and strategic business management to leverage the commercial benefits.

2.2 Intellectual property audit

Dynamic IPM will help in leveraging IP assets. For exploitation of these IP assets, organizations need to understand the available IP assets. In view of this, IPM audit would help organizations to recognize their IP assets and the value of these assets. Since 1990, businesses are conducting IPM audits. IPM audit is one of the emerging IPM practices which help managers to understand the potential IPs in addition to the IPs owned by an organization. “If we know it, we can manage it”, considering this mantra, organizations are performing IPM audits though they are not statutory. IPM audits can be of two types

1) Broad IP Audit and 2) Narrow IP Audit. Another classification of IPM audit will be as 1) General purpose IP Audit; 2) Event Driven IP audit; 3) Limited purpose focused audits.

India is now recognized as a hub for R&D activities for the industrial sectors, particularly relating to information technology, drugs and pharmaceutical, space research, biotechnology, entertainment and several other emerging fields. Trade Related Intellectual Property Rights (TRIPs) compliant IP Laws in India coupled with strong enforcement mechanism and vibrant judicial system, created some of the best investment opportunities and conducive environment for protecting the IP rights in order to enable the industrial community to diversify its commercial activities.

In India, the legislative system has created various laws or amended existing laws to align with international IP laws. The changes in the recent time have come through the enforcement of various Acts such as, the Trademarks Act 1999 along with rules, 2002; Copyrights Act, 1999; Designs Act, 2000; Protection of Plant Varieties and Farmers' Right Act, 2001 along with rules, 2003; Geographical Indication of Goods (Registration and Protection) Act,1999; Patents Act, 1970 with amendments 2005, Biological Diversity Act, 2002 along with rules 2004, Semiconductor Integrated Circuits layout Design Act, 2000; and Information Technology Act, 2000. Basic existing policies have been changed due to changes in legislation, resulting in emergence of various new policies.

WIPO published a white paper on IP audit in which they had enlisted the needs of IP audit. IP audit and management become necessary as IP audit 1) examines and evaluates the strengths and weaknesses of the procedures used to protect each IA, and secure appropriate IP rights; 2) provides tools to develop additional processes, make improvements to existing processes, and take appropriate measures to ensure capture of future IP rights; 3) provides tools and processes to help minimize issues involving third party rights. Its purpose is to uncover under-utilized IP assets, to identify any threats to a company's core business, and to enable business planners to devise informed strategies to maintain and improve the company's market position; 4) helps in significant acquisition of a technology or product; 5) benefits in systematically planning for the built up of a new set up; 6) helps in checking the growth of an organization; 7) helps to analyze critical situation in a life cycle of organization to ensure the continuing adequacy of such procedures, and to detect defects therein; 8) provides bargaining chips for cross-licensing.

IP audit 9) is also appropriate in conjunction with development of a major new product, particularly if such product carries with it a demonstrable risk of infringement; 10) of limited scope may be

necessitated in response to a change or new development in the law; 11) may be necessary to organization to review the adequacy of, 'clean room' procedures; 12) is necessary for accomplishing successful initial public offering (IPO); 13) helps in blocking competition; 14) is needed to establish next-generation power in neighboring markets; 15) is needed to attract venture capital; and 16) is helpful to increase the value of established firms.

IP Audit practices, and its objective change as per the industry, national or firm level but basic objective of IP audit is effective utilization of IP resources. Some of the attributes ensuring an optimum IPM in practice are : 1) Understanding the importance of IP, and perform SWOT analysis in consideration of IP rights; 2) Considering IP as a top management level issue; 3) Mapping and sorting the existing IP owned; 4) Formalization of IP strategy/policy; 5) Linking IP strategy with business strategy. Literature on IPM audit practices followed at organizations is illustrated in Table 2.

Table 2: IPM audit practices (Developed by author)

Sr. No.	Research paper / White paper/ Law firm report title	Authors	Major focus	Year
Inventory approach				
1	Performing an IPM audit of copyrights	Hayes David	Copyright related issues are highlighted	1997
2	IPM audit	Meyer Stuart and Patel Rajiv	Suggested key issues to be addressed during IPM audit as ownership, infringement	2005
3	IPM audit	Nouvelles L.	Focus on IPM	2003
4	IPM audit checklist	Singleton Alan R.	Stock check through questionnaire	2007
5	Intellectual property auditing: a road to riches	Ch'ang Sharyn and Yastreboff Marina	Suggested three stages method	2003
Case study approach				
1	A holistic audit of managing IP	Steffens Paul and Waterhouse Michael	Focus on IPM	2000
2	Managing IP in the financial services industry sector: Learning from Swiss Re	Bader M.A.	IPM practice	2008
3	The University of the XXI century : intellectual capital as a new answer for management	Sanchez P., R. Castrillo and S. Elena	IC management	2006
4	Development of audit system for IPM excellence	Tak-Wing Liu, Kwai-Sang Chin	IPM practice	2010

5	Balanced score card implementation for IP	Smandek Bernhard, Barthel Andreas, Winkler Jens and Ulbig Peter	Optimization of licensing income & cut costs	2010
IP analytics approach				
1	Strategic IP portfolio management: technology appraisal using technology heat map.	Miyake M., Mune Y. and Himeno K	Suggested interlink-age between IPM, business strategy and R & D strategy	2004
2	Patent portfolio audit	Cullen Susan E	IPM audit and IP lifecycle	2010

The literature review clearly highlights that the subject of IPM audit is viewed differently by researchers and practitioners. As shown in Table 2, three major approaches followed by researchers. These are the inventory, case study, and IP analytics approach.

For IP audit study, author have focused on the IP classification according to law. IA are classified into two categories: IC and IP. IC is further classified into human capital, organizational capital and relational capital. IP is classified further as patent, copyright, trademark, industrial design, layout design of integrated circuit, geographical indication, trade secrets, and protection of plant varieties and farmers' rights. For each IP, separate Acts are enacted in various countries, under the TRIPs guidelines. Figure 1 details the classification of IA.

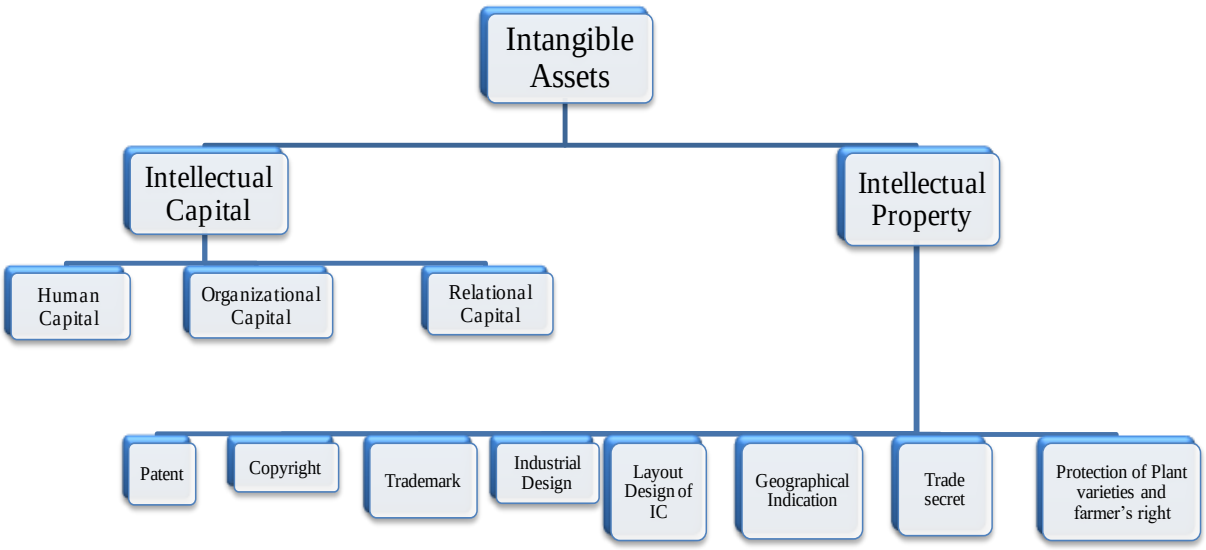


Figure 1: Classification of IA (Source-Developed by author)

3. RESEARCH METHODOLOGY

The study adopted qualitative and exploratory research methodology. The methodology employed for this study is a combination of literature survey, expert opinion and case study. Type 3 case study method is followed. Literature survey was carried out keeping in mind the relevance of the topic under study. Data is collected through questionnaire, records maintained by the R&D office, IP office of an organization and interviews of the concerned authorities and related personnel. Research design is exploratory in nature, and enquiry mode is qualitative. Secondary data is collected from the company website, business reports, business databases, patent database like Thomson innovation, Indian patent and trademark office database. The IP study process can be presented diagrammatically as shown in Figure 2. Here, the first step is to study the organization with reference to IPM, and then enlist the IPM practices followed at the organization. Questionnaire and interviews are the tools which helped to get the information.

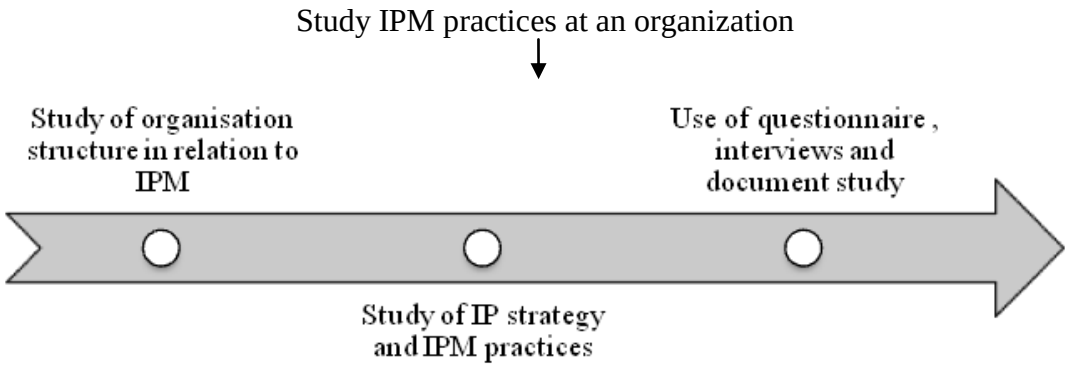


Figure 2: IPM audit study process

4. CASE STUDIES

The study focus is to understand the IPM practices followed by organizations in developing countries like India, in comparisons to organizations from developed countries. For this study, three organizations from India and three organizations from developed countries were considered. The major criteria applied for the selection of these organizations was the IP filing trend. The annual reports of WIPO and

Indian patent office (2015-16) were considered for the case selection. Along with this, Thomson Reuters report (2015), patent landscaping and ranking of organizations by Evaluserve (2015-16) were used. Thus, the scope of the study was restricted to IP savvy organizations. A list of such organizations is identified from the study of above mentioned reports. After preparing the initial list, the process of contacting these organizations is started for data retrieval. As shared earlier, IP data is very crucial so organizations were hesitating to participate in the study. Persistent follow up helped to get access to these organizations. These organizations also mentioned that the researchers would not be privy to sensitive information. Researcher also followed some legal procedures to get access to the data. For this study, six case studies were selected. Within the six cases selected, it can be noted that one is Indian public organization and the other five are private organizations.

5. INDIVIDUAL CASE ANALYSIS

A theoretical replication of the analytic procedures as suggested by Yin (1984) was employed. The focus or the unit of analysis in each case study was to appreciate IPM practices followed by an organization. During the analysis of the six case studies, detailed processes followed by an organization for IPM were examined in four major perspectives as inventor's perspective, Chief technology officer's (CTO's)/ Vice President's (VP's) perspective that is top management perspective, marketing/finance perspective and IP personnel perspective. The combination of formal structured interview and informal interaction facilitated this phenomenon. All formal and informal interactions, basic knowledge of IPM practices, practical experience of the researcher in IP domain, IP domain expert opinion, and literature analysis were employed to develop an individual case report and cross case analysis. This was initially done for the pilot case, and similar procedures were conducted across the remaining five cases. Table 3 provides macro details of the six case studies performed.

During the case studies, author identified various IPM related processes as well as insights. These are enlisted in Table 4 against each case study.

Table 3: Case study

Company	CS 1	CS 2	CS 3	CS 4	CS 5	CS 6
Organization type	Private	Private	Government	Private	Private	Private
Date of establishment	1937	1938	1964	1847	1891	1930
Strength (Human resource) IP department - India	7	1	7	10	27	3
No of patents	709	900	1030	53,000	55,000	20,511
Response documentation	Notes	Notes	Notes & Electronic transcription	Notes	Notes & Electronic transcription	Notes

Table 4: IPM processes identified and/insights from case studies

CS 1 (16 processes)	
Dedicated IP department	Acquisition to acquire high potential IP
Special budget for IP related activities.	Various filters for Idea selection identified are as development feasibility, market scenario, business relevance, position of technology on technology lifecycle
Data security system	Novelty check and infringement analysis
Visitors and employee restricted areas	Invention disclosure process through invention disclosure form (IDF)/online IDF submission
IP education and training	Projects like new market identification, and demographic mapping is normal practice of business which is used for IPM.
Various motivational aspects for IP generation are 'appraisal', 'appreciation' and 'incentive'.	Before undertaking any project, for new developments in depth study about potential market is conducted

Various sources for idea generation as informal and formal meetings, inputs from vendors, suppliers, customers	Various types of inventories as IP type wise, core IP and related IP type, IP and licensing/in-house/ sale out and so on
Periodic meeting with IP personnel and R&D department to identify potential IP.	Compliance with regulatory processes and other procedures

CS 2 (16 +5 Processes)	
Few more idea generation resources: Patent analytics tool, TRIZ, literature, conferences, periodic competitive intelligence reports, on demand technology mapping reports and technical bulletins covering R&D activities of the organization	Identification of potential IP: Inventor awareness, IP coordinator, liaison, timeline setting for each development stage of the project, mapping probable IP generation
Various types of inventories maintenance: Business unit wise, application and granted status wise, product line, inventor wise , year wise, validity status wise etc.	IP protection decision: Various forecasting and business related inputs. Inputs from marketing department
Help of external resources to conduct infringement analysis.	

CS 3		
CS 3 is a public sector organization and follows almost all IPM processes with few exceptions depicted in CS 1 case.		
CS 4 (16 +5 +4 Processes + 1 interesting observation)	**CS 5 (16 +5 +4 Processes + 1 interesting observation)**	**CS 6 (16 +5 +4 Processes + 1 interesting observation)**
Slow and steady move from “cost center” to “profit center”, and then to “integrated IPM” approach according to “IP value hierarchy”	Business strategy and IP strategy well aligned which helps to do maximum licensing -out	Interesting observation about the IP portfolio value extraction is that only 2-5% IP is really creating the value for the organization. Some 30-40% of IPs are useful during the negotiation activity such as cross licensing, strategic benefit. Remaining IPs are maintained by the organization though they may not have major strategic value.

Quantitative data in the form of patent applications by each organization is analyzed to observe the patent filing trend over the years. Graphical representation of patent trend is shared in Figure 3, 4 and 5. This snapshot provides valuable insight of patent filing trend in those organizations. It can be observed from the patent application trend of all the organizations that at initial stages, the patent filing increases gradually reaching a peak. Then it slowly reduces and attains a particular plateau level. It can also be observed that almost all organizations are showing the maximum patent filling in the year 2009-10.

6. CROSS CASE ANALYSIS

Cross case primary data analysis are aimed at developing insights into the IPM processes and IPMS. To develop the insights content analysis of the interview, transcripts was carried out. A total of forty six respondents were interviewed who are top level executives, IP department personnel or top inventors. As data is related to IP, most of the interviewers did not approve the recording of the interview on any media. Therefore, most of the interviews were recorded by taking handwritten notes. Besides these formal interviews, informal interviews with other functions were also conducted and notes were recorded. Along with the sample set that is six organizations under study, some other organizations' IP personnel, top management people and inventors were interviewed and notes were recorded.

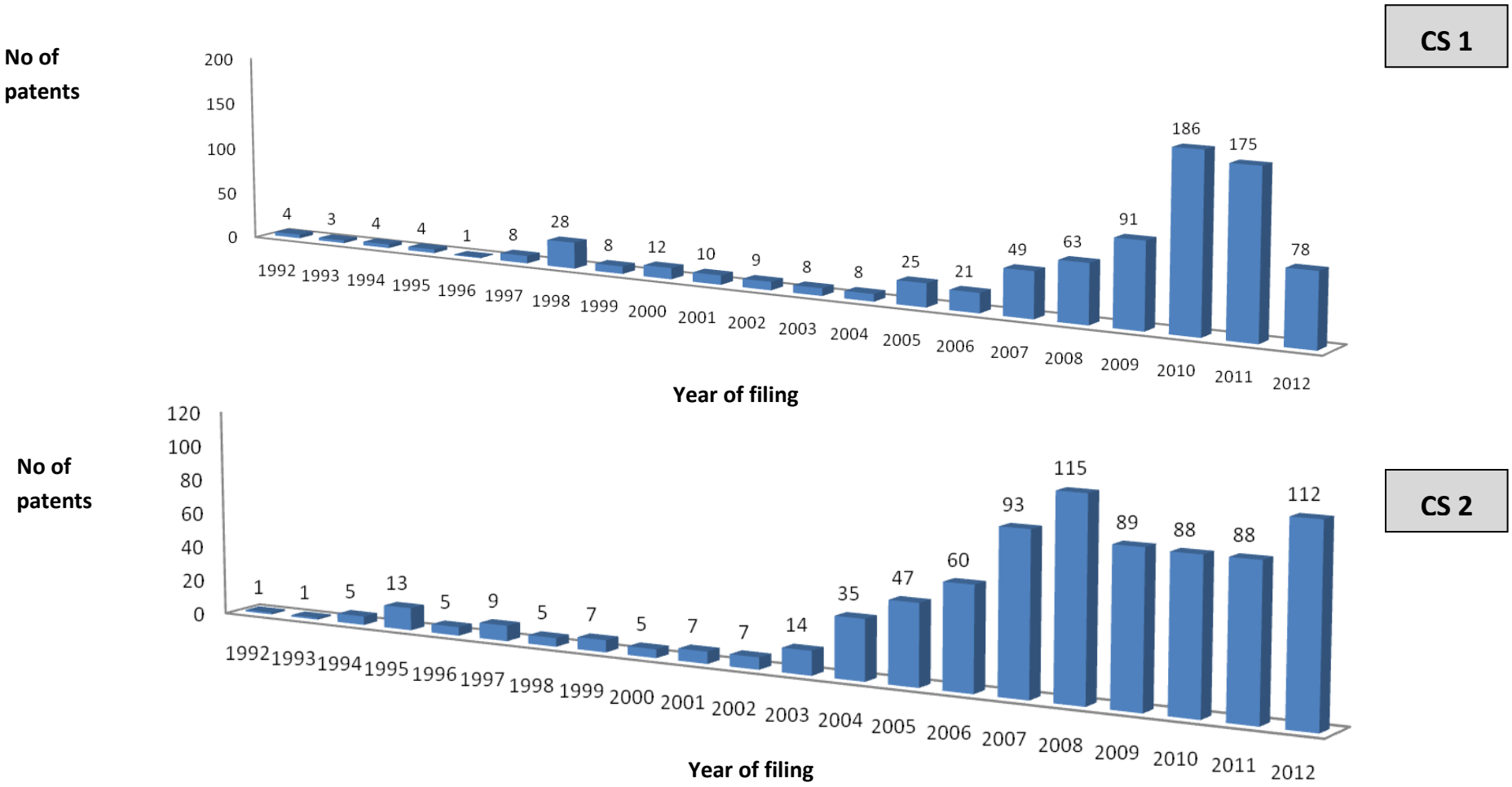


Figure 3: Patent filing trend (CS 1, CS 2)

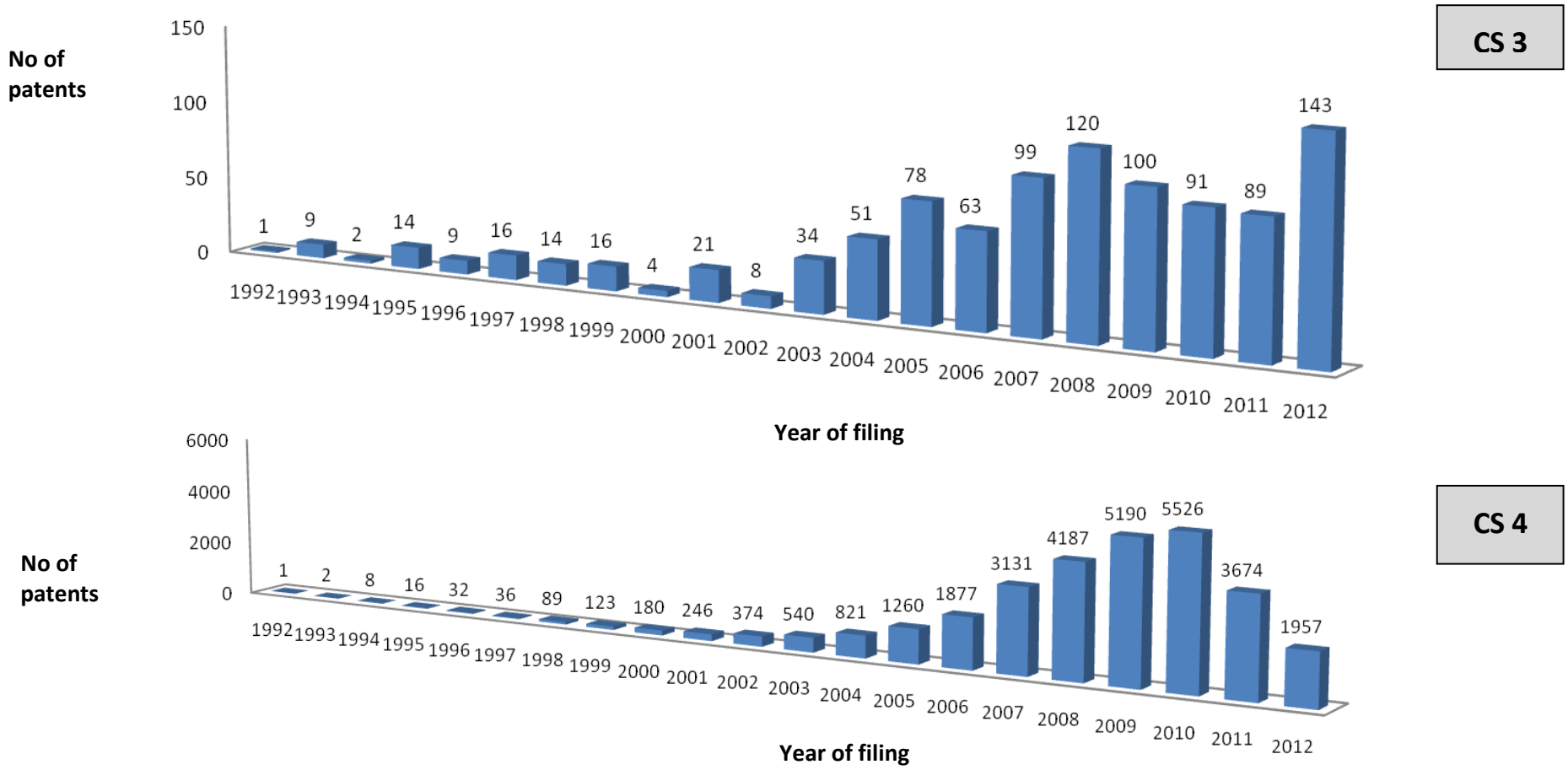
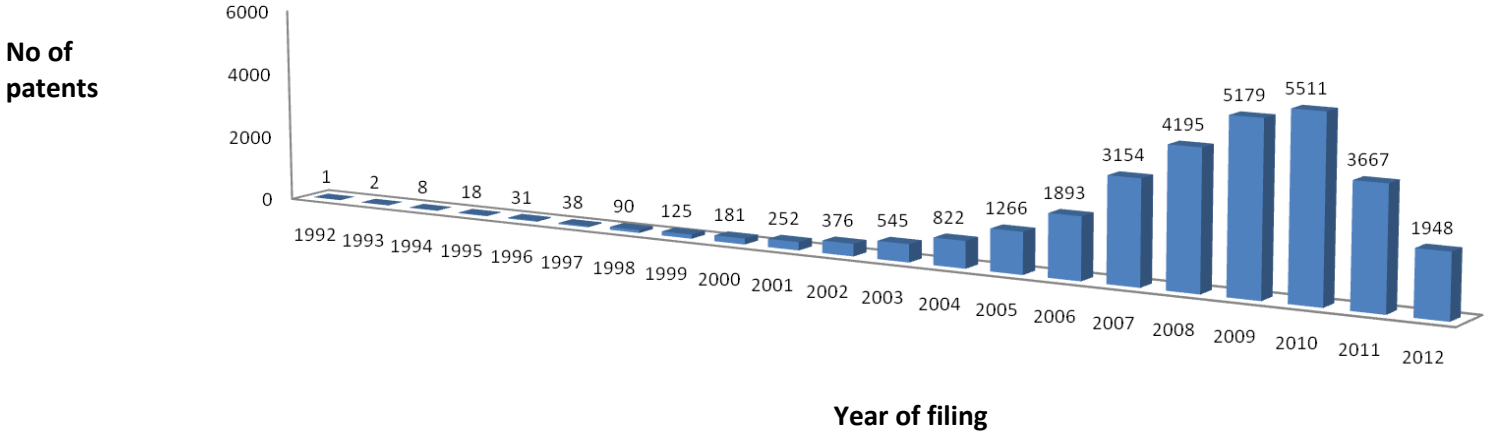


Figure 4: Patent filing trend (CS 3, CS 4)

CS 5



CS 6

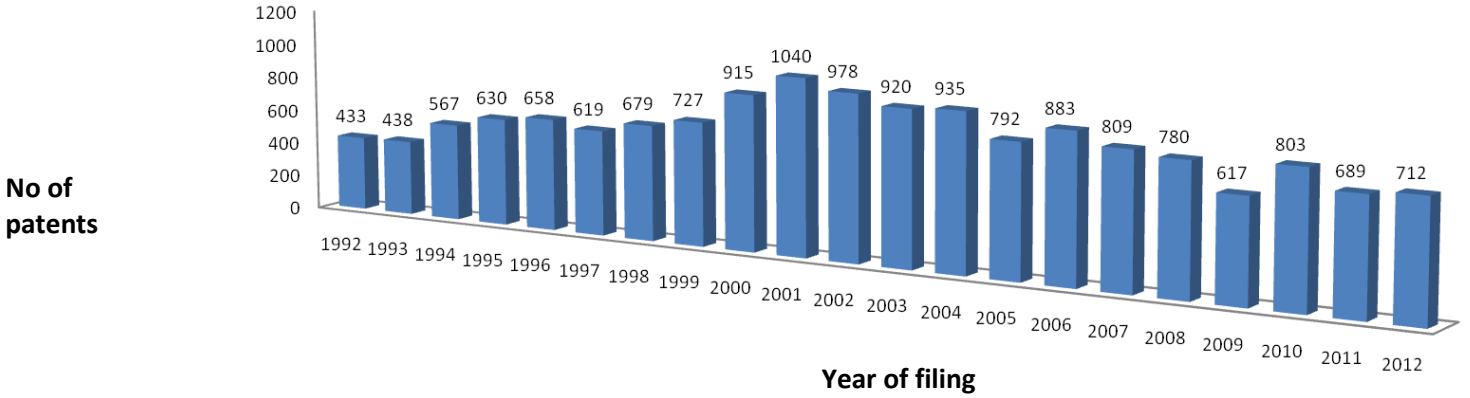


Figure 5: Patent filing trend (CS 5, CS 6)

7. IPM AUDIT MODEL

Holistic consideration of qualitative and quantitative data resulted in development of "IPM audit model". Considering the complexity of the IPMS, the processes and/or insights identified are analyzed in detail to develop the IPM audit model for efficient management of IP as shown in Figure 6. The IPM audit model divides IPM practices into various categories and levels which help to focus on a particular activity, and also helps to have a holistic view of IPMS to manage IP. Proposed IPM audit model has 4 major stages as pre IPR stage, IPR stage, post IPR stage, and IP acquisition. Pre IPR stage is divided into 4 sub stages as idea generation, idea documentation, idea selection, and invention disclosure. IPR stage is divided into three stages as physical security, IP policy and agreement, and IP system. IP commercialization stage is divided into technology transfer, product/process clearance and IP maintenance. IP acquisition is divided into acquisition need and acquisition process. Each sub stage is further divided into various categories as depicted in the Figure 6.

8. CONCLUSION

The six case studies performed here demonstrate that organizations pursue IPM activities, spread across various functions. The qualitative analysis and thorough examination of the data helped to understand the complexity of IPM process and IPMS. It is observed that IPM is not an independent activity and is reliant on 5 major factors as business strategy, IP strategy, technology strategy, IP and law human resource availability and IPM tools accessibility. It is also observed that IPM is effective if it is aligned with innovation management process. The proposed IPM audit model provides systematically all IPM related processes which will help organizations to develop IPMS for efficient technology and IP management.

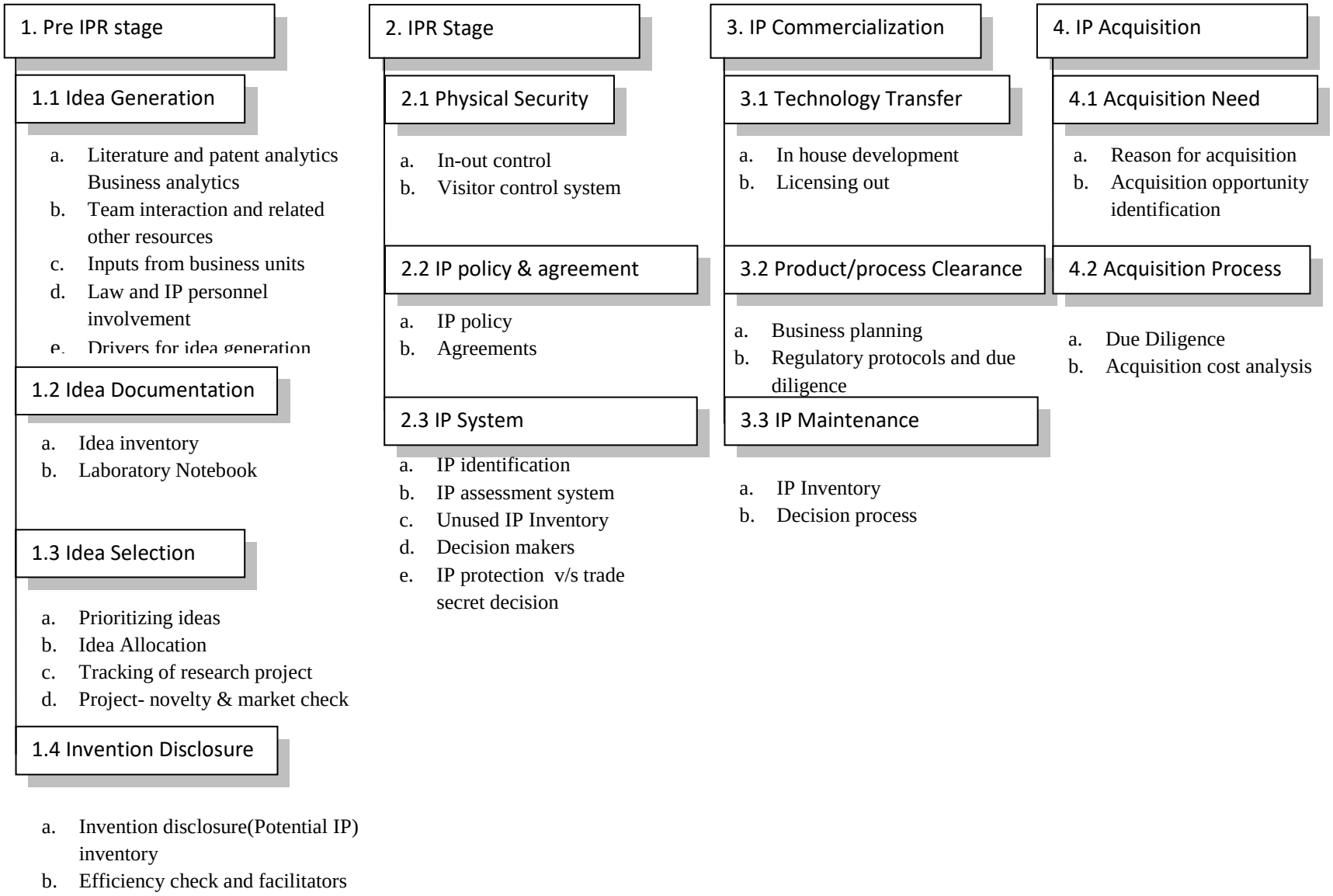


Figure 6: IPM audit model

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