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IP Audit: A Case Study of IIT Delhi

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Intellectual property (IP), can be developed, owned, managed and commercialized to generate significant economic return to empower the organization. In this era, where IP regimes are shifting drastically and where intangible assets are gaining prominence with huge momentum, identifying and efficiently utilizing intellectual assets owned by an institution is of utmost importance. Hence, it is now imperative for institutions to develop the expertise and capability not only to foster the generation and creation of IP through R&D, but also to manage the same. In this paper, the authors intend to understand the IP policy framework of the institution, and conduct a basic IP audit which helps to understand the strength of the IP management system.

Keywords: Intellectual Property, IP Audit, IP Policy, IPMS, Intellectual Capital, IPR Score, IP Portfolio, Intangible Assets, Technology Transfer

IIT Delhi is an academic institute committed to excellence in teaching and research and its activities are based on knowledge and intellectual exercise.[1] IIT Delhi has a stupendous IP portfolio which has now become an integral part of every institution in the evolving scenario of the world today, where intangible assets (IA) have become more significant and valuable. Consequently, there is a need for an effective IP management (IPM) of the institution which has to be catered to and cannot be dispensed with.

IPM is a multifarious branch of study which deals with generation of IP, its protection, and exploitation catering to rapid changing market demands across the globe.[2] IPM predominantly deals with policy formulation, designing the strategies for acquiring, protecting and exploiting the technology developed. IPM system (IPMS), a managerial and policy tool, aids in accumulating and further assuring the worth of a rich IP portfolio.[2] IP strategy implementation necessitates collaboration of various subsystems of an institution, and in turn, aids to keep a track of the IPM framework and portfolio.[2] Apart from this, this activity includes patent portfolio maintenance such as enhancing the amount of potential patents for patent decision processes, portfolio cost management, valuation of patent, and determination of optimum series of conversion technique for value extraction from patents.[2] The key areas of IP management includes generation of IP, administration of IP, maintenance of IP, IP acquisition and IP enforcement (Fig. 1).[2]

IPMS aids to maintain the complete inventory of an institution's IP, helps to determine value of IP assets, expected revenue, and estimates IP's contribution to profitability of the organization, by way of mapping each IP asset to firm's products and services, establishing structure and system for IPM and dissemination of firm's IP assets.[2] (Fig. 2).[2]

Intellectual Property Management System

IA is pivotal for the economy as it generates commercial benefits. Hence, it has now become imperative for institutions to develop the expertise and capability not only to foster the generation and creation of IP through R & D, but also to manage the same.[2] It is necessary to keep a track of an organization's IP portfolio by managing the same as IPM aims to stimulate creation of IP, its protection, and utilizing the IP to its maximum advantage to enhance revenue generation and hence aids organizations to evaluate their patent portfolios.[2] Organizations and institutions have their IPMS in order to make certain the accessibility of data and statistics pertaining to intangible capital and IA for strategic decision making.[2] Structured IPMS plays an instrumental role in developing an institution by enhancing IP filing, technology transfers, and by

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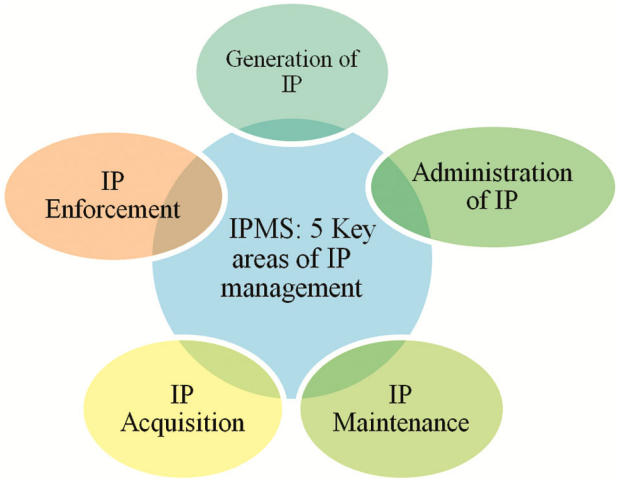

Fig 1 — Key Areas of IPMS (*Source: Gargate, Momaya, 2018*)

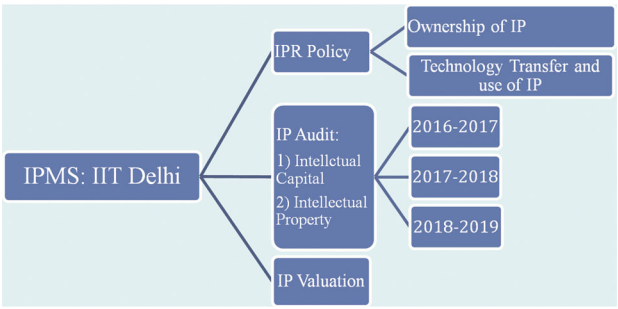

Fig. 2 — Framework of the paper

taking steps to introduce and facilitate research programmes.[2] As a means to analyze the concept of IPMS, it is imperative to understand the IP policy framework of any organization, to comprehend the significance of IP valuation for generating economic benefits and to conduct IP audit extensively which helps an organization to strengthen the IPM .

IP Policy

An IP policy provides structure, predictability and a beneficial environment in which enterprise and researchers can access and share knowledge, technology and IP.[3] IP policy of an organization stipulates rules pertaining to ownership of IP, guidelines for research operations, guidelines for technology transfers and technology management, the legal framework for commercialization, rules pertaining to benefit sharing, Innovation and creativity in the organization, Local and National economic growth.[3]

IP Audit

IP Audit is a methodical analysis of the IP owned, used or acquired by an entity to evaluate and manage risk, solve problems and effectuate the best practices in IP asset management.[4] IP audit of an organization entails a structured and methodical review of the organization's IP assets, related agreements, and the inventory of the IP assets, relevant policies and compliance procedures.[5] IP audit aids to access and analyze the way the IP assets are used, calculate the IP unused, number of assets owned, transferred and licensed by the organization, whether the IP assets infringe the rights of others or others are infringing on these rights, What all measures are required to be taken with respect to each IP asset and so on.[5] IP Audit helps in keeping a check on several IP management related processes and the level of the performance of each process.[2]

IP Valuation

IP valuation is a method to evaluate and estimate the monetary value of IP on account of the fact that the value of an asset is the value of the future commercial benefits it generates. The value of an asset, whether tangible or intangible, can be estimated using certain methods. On one hand, some assets are convenient to value than others, and on other hand some valuations are more precise than others. Monetary or financial valuation is the method of evaluating the worth of an asset in certain circumstances, the price of an asset may be a good indicator of its value. IP asset derives its worth from its potential to exclude and eliminate competitors from a particular market. On one hand the legal right over an IP bestows right to exclude others, on the other hand the economic rights grants exclusivity of use, that is, the ability to regulate the usage of the IP asset. In order to have a quantifiable value, IP asset should yield sufficient economic and commercial benefit to its owner.[2]

Establishment of IIT Delhi

The Government of India negotiated with the British Government and collaborated for setting up an Institute of Technology at Delhi. They came to a consensus that a College of Engineering & Technology should be established at Delhi.[12] Subsequently, H.R.H. Prince Philips, Duke of Edinburgh, laid the foundation stone of the College at Hauz Khas on 28 January 1959. The institute was registered as a Society on 14 June 1960 under the Societies Registration Act No. XXI of 1860 (Registration No. S1663 of 1960-61).

Indian Institute of Technology Delhi (IIT Delhi) established in 1961 is a public technical and research university located in Hauz Khas in South Delhi,

Delhi, India. IIT Delhi was inaugurated in August 1961 by Prof. Humayun Kabir, Minister of Scientific Research & Cultural Affairs. IIT Delhi is one of the 23 IITs established as the Centres of Excellence for training, research and development in science and technology in India. It was established as Institute of Engineering in 1961 and subsequently in 1963, was declared as an Institution of National Importance under the Institutes of Technology (Amendment) Act, 1963 and was renamed as 'Indian Institute of Technology Delhi'. Later it was conferred with the status of a Deemed University and therefore had the authority to decide its own academic policy, to conduct its own examinations, and to award its own degrees.[12] At present there are 15 departments, centres and 6 schools as shown in Fig. 3.[13]

IIT Delhi has a well-structured IPpolicy to create an environment that shall foster the growth of intellectually capable, innovative and entrepreneurial professionals. The policy facilitates generation, protection and exploitation of IP generated at IIT Delhi. Keeping pace with the fast growth of industry and national economy, the institution has especially taken up a wide range of activities from creating awareness, conducting academic programs on IP, organizing regular IP counselling programme for the research scholars to developing human resource and a framework for IP generation and management. To enhance the growth of IP, IIT Delhi provides a platform to: (i) encourage innovation and research on contemporary issues of national and international relevance leading to creation of IPR; (ii) promote and establish collaborative frameworks for industry-institute partnerships at national and international scale to initiate research and development of commercial value; and facilitate, encourage, promote and safeguard intellectual property.

IP Policy of IIT Delhi

The present IP Policy of the institution is in tandem with the vision and mission of IITD, and therefore the policy supports outreach of the novel and inventive technologies developed at IITD. Apart from this, the policy encourages the faculty, students and researchers of IITD to initiate technology transfer using the intellectual property rights extracted from a novel technology (Table 1).[14]

IPR Policy of IITD

(i) Facilitates the institute to discharge its principal responsibility of fostering, stimulating and encouraging innovative activities in the domain of science and technology;

(ii) Stipulates the norms to safeguard the legitimate interest of faculty/students/ project staff/ supporting staff /visitors and the society in a rational and structured manner in tandem with the 'commitment' of IITD and 'role' allocated to it by the society;

(iii) Enables a transparent system for the ownership, control and transfer of the IP generated and owned by the Institute;

(iv) Shares a worldwide perception of practices related to IP retaining national identity and local constraints, circumventing 'conflict' of opposing interests;

(v) Takes into account the sustainable use of bio-resources and conservation of biodiversity;

(vi) Encourages fair use of traditional knowledge while taking into consideration the local

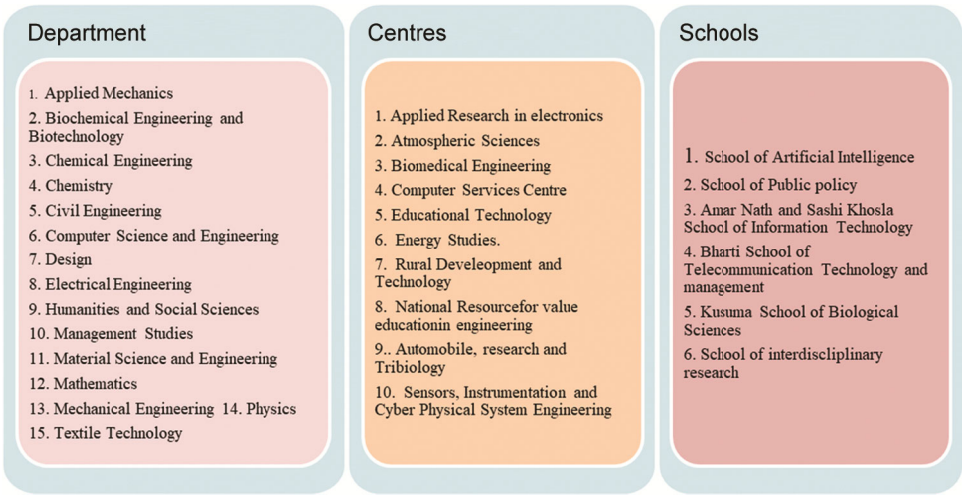

Fig. 3 — Departments, schools and centres of IITD

Table 1 — IPR Policy of IIT Delhi

Ownership of Intellectual Property (IP)	
Owned by	Conditions
Exclusively by IIT Delhi	IP has been developed solely with the use of funds/facilities provided by IITD; IP has been developed with the use of external funds/facilities or with a mix of funds/facilities; IP has been developed under any contract arrangement including 'work for hire'.
Third-party (exclusively or jointly with IITD)	IP has been developed with external funding from third- party such as, sponsored research, consultancy projects and other collaborative activity with a formal associated agreement; it will be owned by third party, solely or jointly.
Inventors	Only when none of the situations defined above for IITD or third-party ownership applies, and the IP is unrelated to the inventor's engagement with IITD.
Student can own copyright	Copyrights of thesis, dissertations, term papers, laboratory records, and of other documents that are produced by a student during the course of his/her study will reside with the student unless restricted by an associated agreement and/or research carried out using facilities that have come to IITD with pre-imposed IP protection restrictions.
	Technology Transfer and Use of IP
Trade-secrets and know-how	Confidentiality is maintained by exchanging information with non-disclosure agreements (NDA).
IP licensing and assignment	Licensing can be in the form of exclusive licensing, sole licensing, non-exclusive licensing and sub-licensing.
Revenue sharing between IITD and inventor	IITD reserves the right to determine the share of the different stakeholders involved in IP creation and dissemination from time to time.
Transfer of biological resource and associated knowledge	The Biological Diversity Act 2002 of India prevents any person from transferring the results of any research for financial consideration or otherwise to such persons/entities without prior approval of the National Biodiversity authority (NBA).

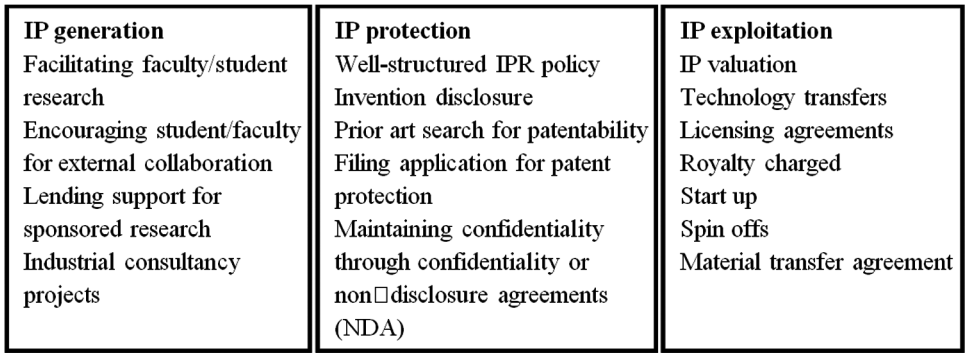

Fig. 4 — IIT Delhi: Overview of IPMS at IIT Delhi

traditional knowledge stakeholders and benefit sharing.[14]

Intellectual Property Audit of an Institution

IP audit is defined as a methodical analysis of the IP owned, used or acquired in order to assess and manage risk and effectuate best practices in IP asset management.[15] IP audit is a tool which is utilized by organizations to take into consideration the intangible assets which they have generated or developed in a certain span of time. Conducting an IP audit helps to uncover unused or under-utilized assets; determine ownership of these assets; and identifies any related threats, i.e. IP infringement.[15] Intangible assets can be classified into intellectual capital and intellectual property (Fig. 4).

Intellectual Capital

Human Capital

Human capital is an intangible asset which includes education, training, intelligence, skills, health, and other things. It encompasses the notion that the

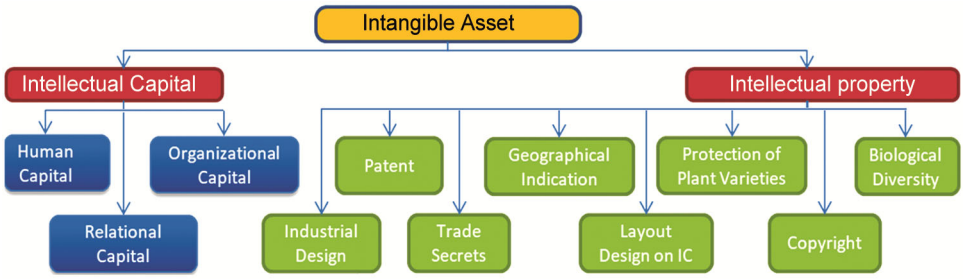

Fig. 5 — Intangible assets (*Source- Gouri G., K. Jain, 2012)*

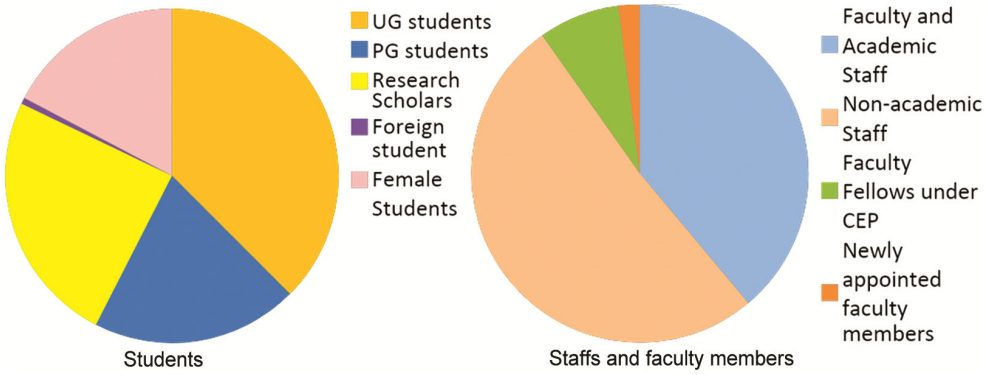

Fig. 6 — Human capital of academic year 2016-2017, *Source: Annual Report, IIT Delhi*

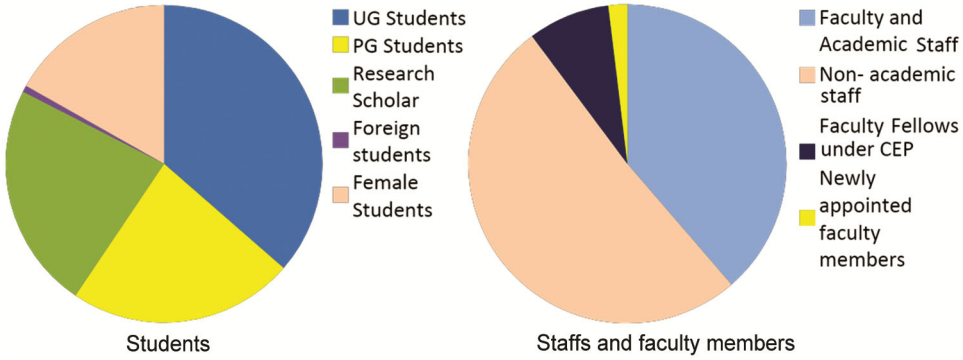

Fig. 7 — Human capital of academic year 2017- 2018, *Source: Annual Report, IIT Delhi*

investments in people (e.g., education, training, health) increase individuals' productivity. Human capital is regarded to have a co-relation with economic growth, productivity, and profitability (Figs. 5-7).[15]

Relational Capital

Relational capital is one of the three principal constituent of intellectual capital, and is the value inherent in a company's relationships with its customers, vendors, and other important constituencies. It also incorporates knowledge, capabilities, procedures and systems which evolve from relationships with external agents.[16] As suggested by Sanchez, relational capital is the external relationship of the institution such as customers, suppliers, R&D partners, Government etc. Relational capital considered here is collaboration of the department with external partners for consultancy projects, research projects, sponsored research, institutional consultancy, research-based industrial project, and visitors including experts, alumnus to the department (Fig. 8).[16]

Organizational Capital

Organizational capital is as intangible as human and social capital. Organizational routines are generally stable for intermediate time periods. Despite this stability, organizational capital is exposed to the risk of becoming obsolete due to imitation or innovation of competitors (Lev and Radhakrishnan 2005). Only the part of organizational capital that

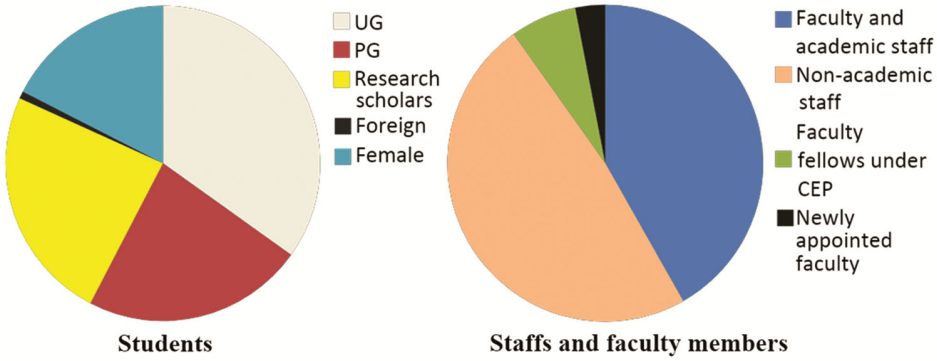

Fig. 8 — Human capital of academic year 2018-2019, *Source: Annual Report, IIT Delhi*

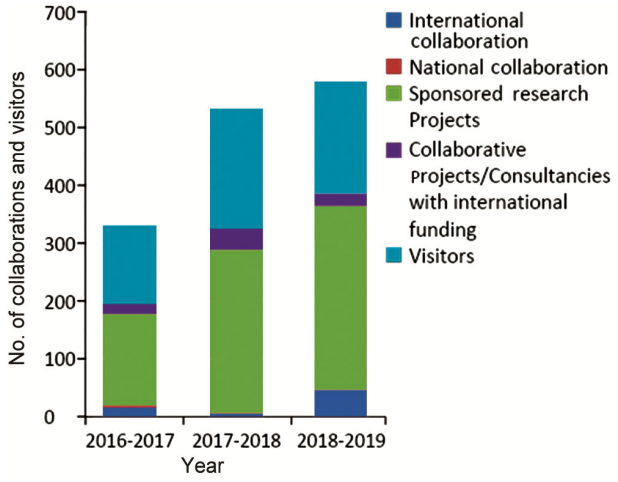

Fig. 9 — Collaborations and visitors, *Source: Council of Indian Institute of Technology*

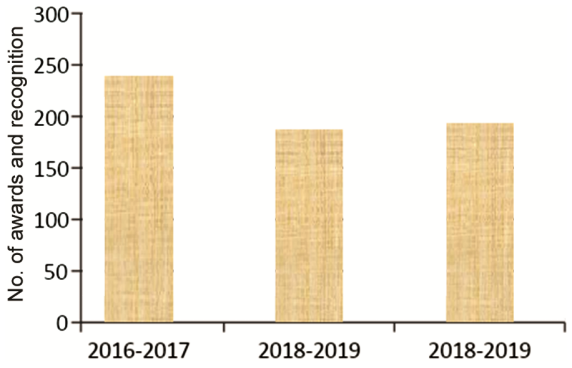

Fig. 10 — Awards and recognition, *Source-Council of Indian Institute of Technology*

cannot be imitated can generate a sustainable competitive advantage.[17]

Lev and Radhakrishnan state that "*Organization capital is an agglomeration of technologies – business practices, processes and designs, that together enable some firms to consistently and efficiently extract from a given level of physical and human resources a higher level of product than other firms find possible to obtain*."[17] Sadowski provides a similar, but more specific, definition: "*If an enterprise succeeds in giving itself an order, including an amount of rules to share information, settle conflicts, secure the willingness to cooperate, then we can call this order with good reason 'organizational capital*".[17]

The academic unit received various recognitions and awards (Fig 9). The academic units which were consistent in its performance and were felicitated in all the three years are Biochemical Engineering and Biotechnology, Chemical engineering, Chemistry, Civil Engineering, Computer Science Engineering, Management Studies, Electronics, Mechanical Engineering, Physics, Atmospheric Science, Amar Nath and Shashi Khosla School of Information Technology.

Intellectual Property

Patents, Designs, Trademarks and Copyrights

IIT Delhi has a concrete IP portfolio. IP Portfolio which has now become an integral part of every institution in the evolving scenario of the world today, where knowledge assets and intangible assets have become more significant and valuable. It is pertinent to note that in the calendar year 2019-2020, IITD has filed 150 IPs in the form of patents, designs etc. The institute has filed 20% more IPs in 2019 compared to 2018.[18] According to Prof. Ramagopal Rao, Director IITD, the institute had a four-fold rise in revenue from its IP licensing activities.[19] Figures 10-14 presents the IP generated in the three consecutive academic sessions 2016-2017, 2017-2018 and 2018-2019.

Application of IP Audit framework to IIT Delhi

IP audit for IITD had been conducted for the academic years 2016-17, 2017-18 and 2018-19 using the basic"IP Audit Framework" developed by Gargate and Jain, 2012. For the same, data pertaining to IP are

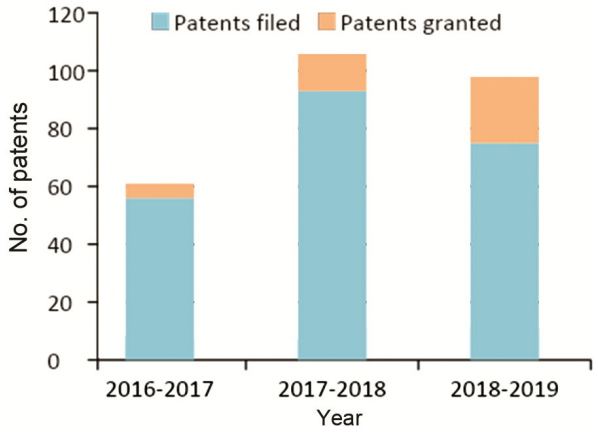

Fig. 11 — Year-wise patent filed and granted, *Source: Council of Indian Institute of Technology*

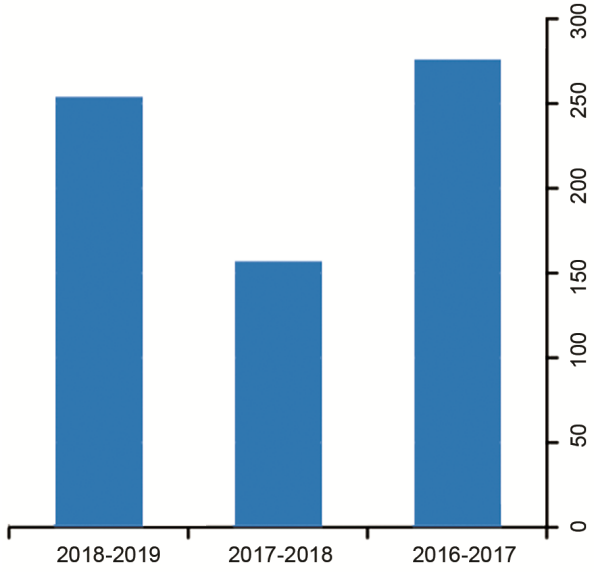

Fig. 12 — Year-wise conference and seminar details, *Source: Council of Indian Institute of Technology*

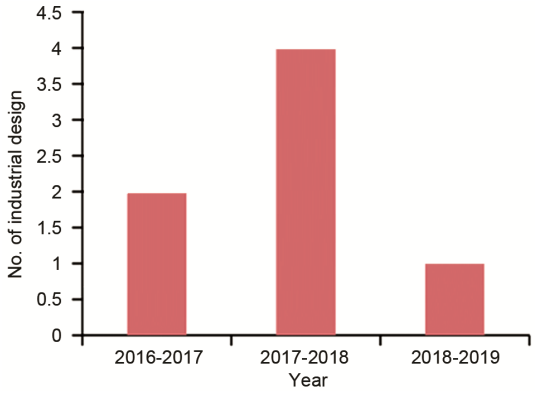

Fig. 14 — Year-wise industrial design generated, *Source: Council of Indian Institute of Technology*

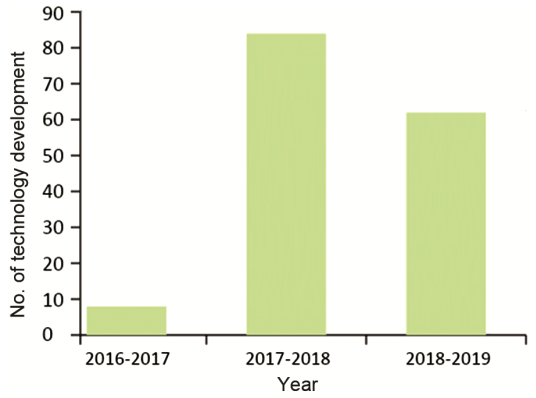

Fig. 15 — Year-wise technology development, *Source: Council of Indian Institute of Technology*

fetched from secondary resources which include but are not limited to annual reports, institute websites and other relevantwebsites. The data so collected is represented in the IP audit framework (Figs. 16-18). Further, using this framework, IPR score is generated based on the IPR credence (Table 4). Though, there have been great

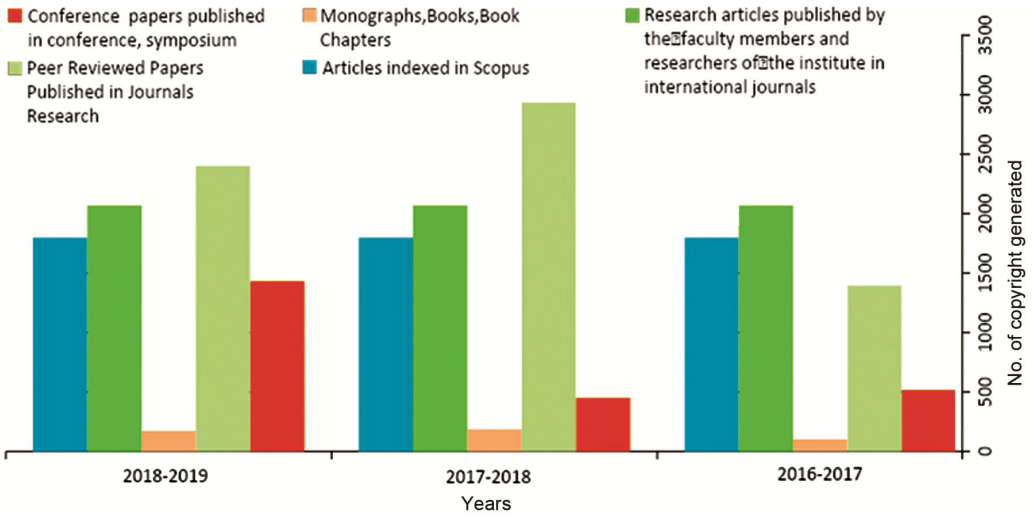

Fig. 13 —Year-wise copyright generated, *Source: Council of Indian Institute of Technology*

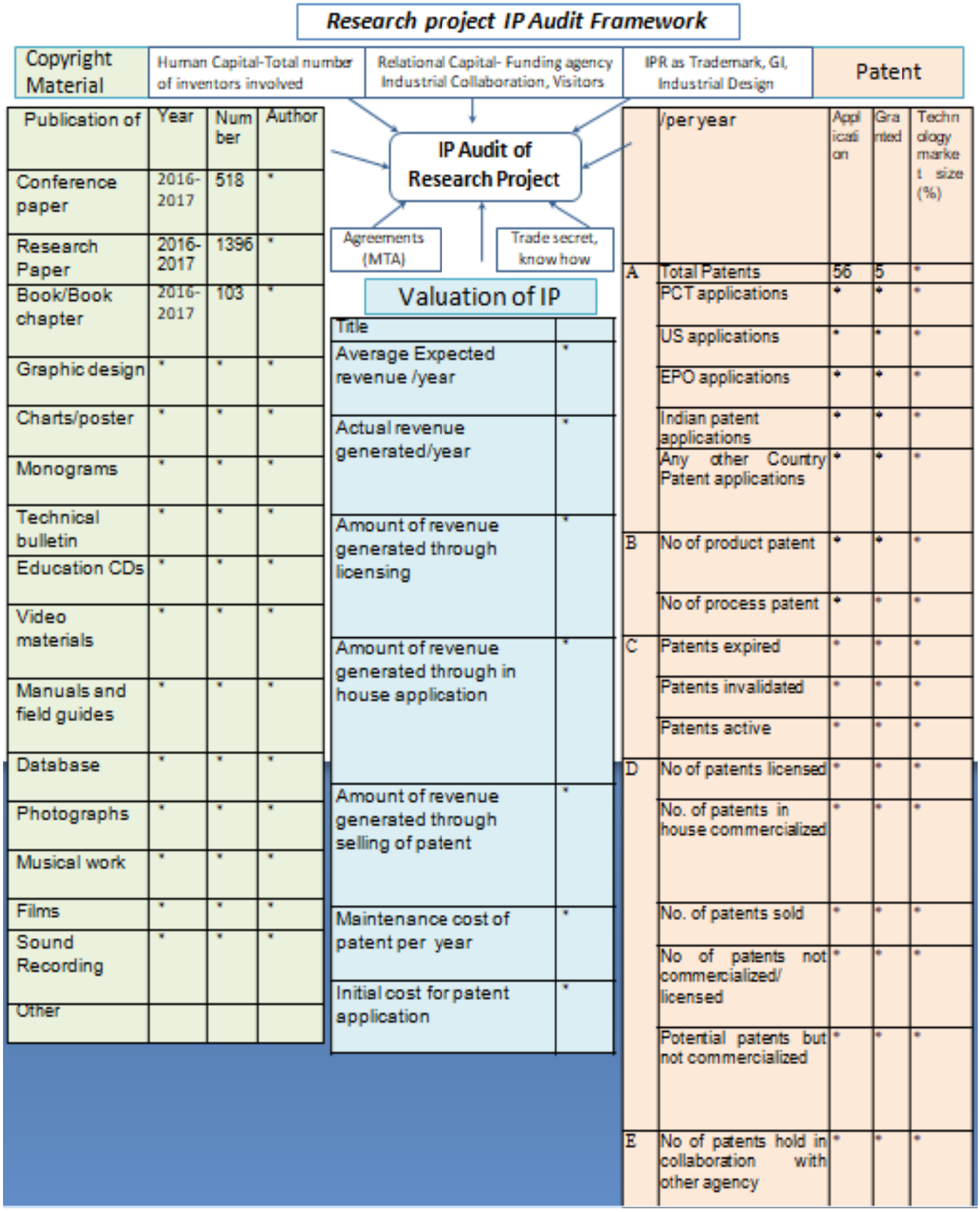

Fig. 16 — IP audit framework- academic year 2016-2017

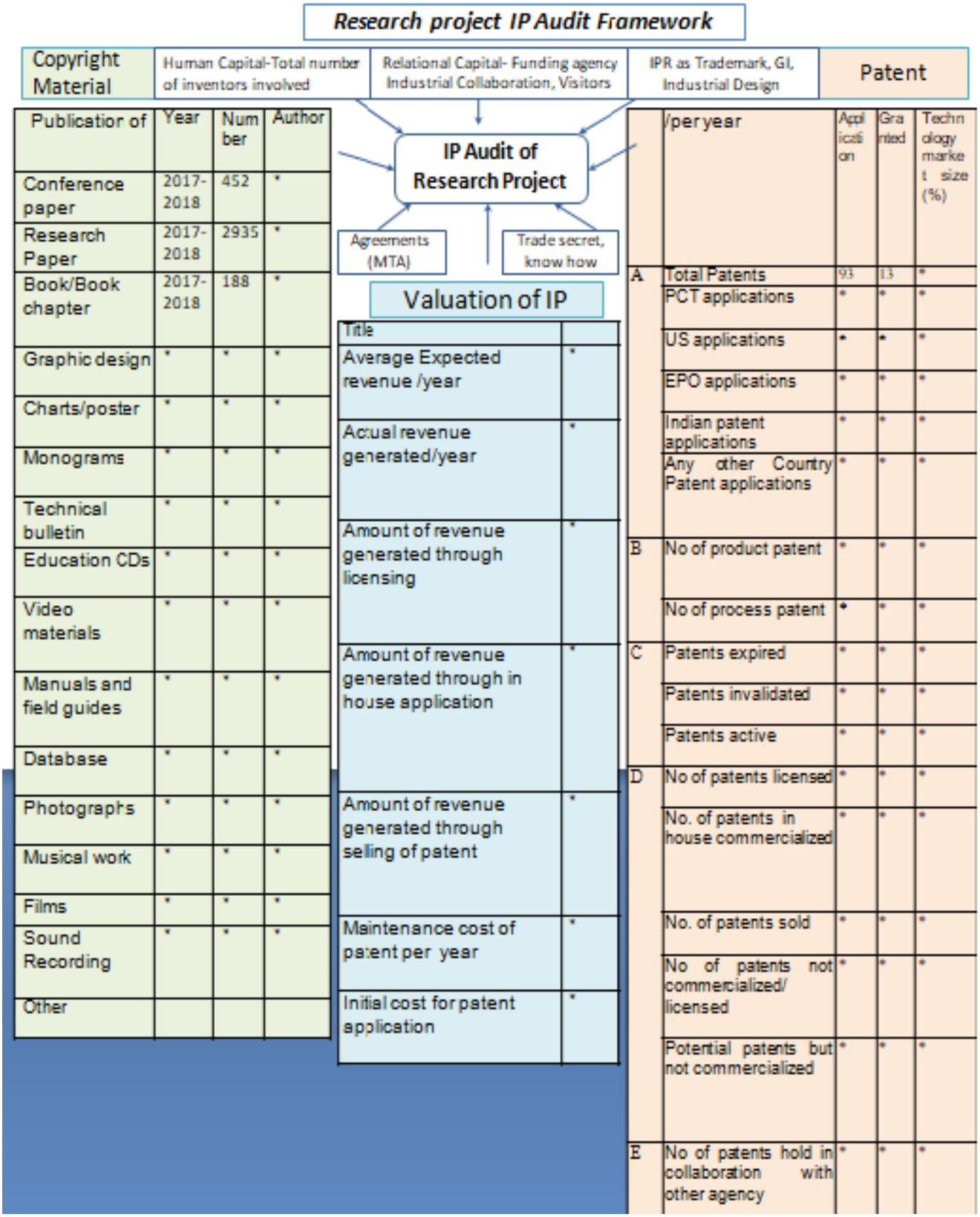

Fig. 17 — IP audit framework- academic year 2017-2018

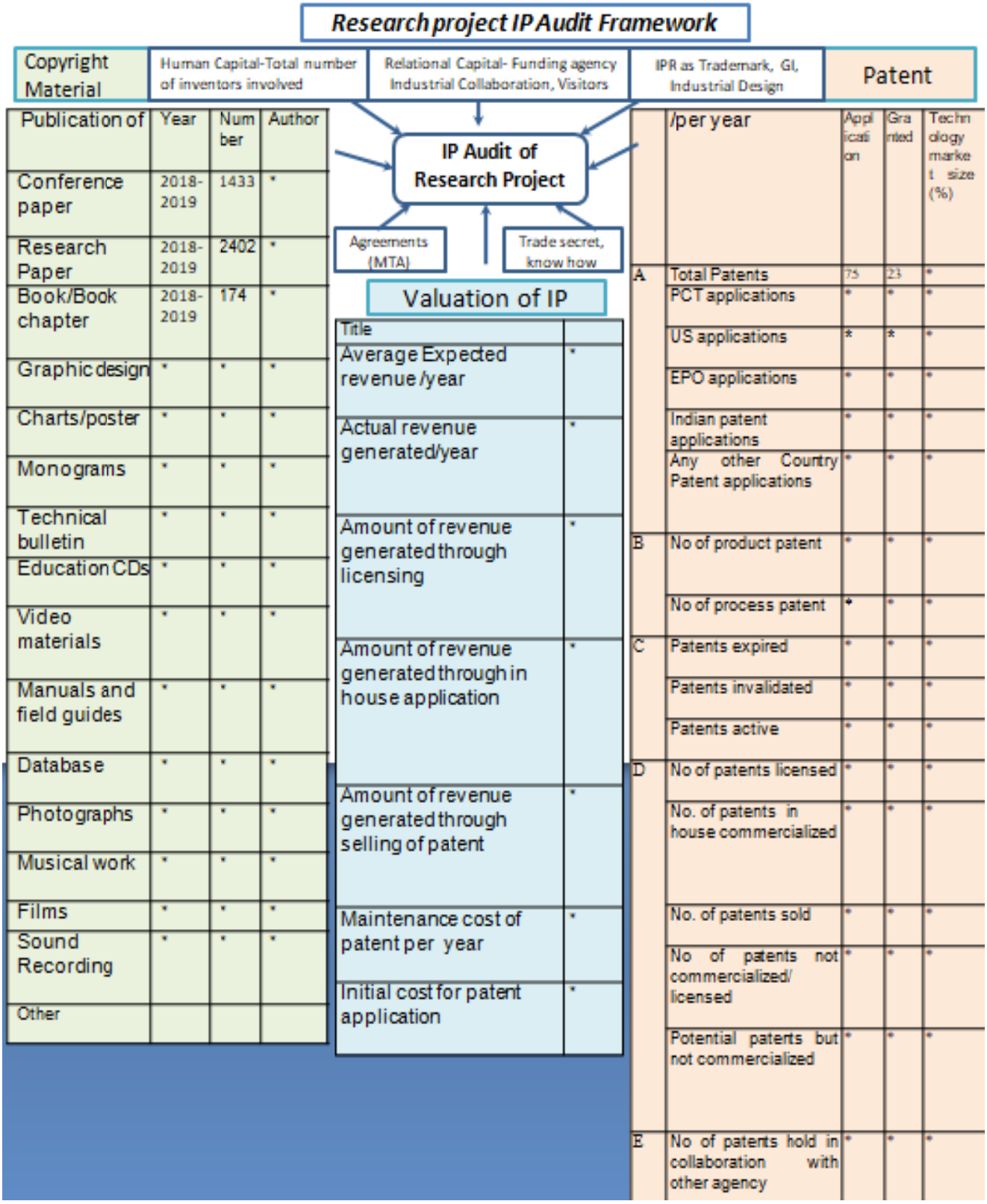

Fig. 18 — IP audit framework- academic year 2018-2019

Table 2 — IPR credence

IPR	Credence
Patent	03
Copyright	01
Industrial Design	02
Trademark	1.5
Layout Design of IC	02
Geographical Indication	1.5
Trade Secret	00
Plant Varieties and Farmer's Rights	03

Table 3 — IPR score

Academic Year	IPR score
2016-2017	2036
2017-2018	3622
2018-2019	4082

limitations to the data due to institute's confidential information policy, authors have attempted the application of the basic IP audit framework. The objective of conducting this case study is to ensure whether the IP audit framework can potentially demonstrate generation, protection and maintenance of IP over a certain time span.

IPR Score

IPR score for each academic year is evaluated using the IPR credence suggested by Gargate & Jain, 2012 (Table 2 and 3).

Conclusion

Over the years, IPMS has been developed in IITD which has led to the enhancement of IP generation, which are subsequently protected and commercialized (Fig. 15). R&D outputs of IITD include product and process patents, industrial design, copyright, technology know-how. To enhance and augment the rate of innovation, IITD has created an autonomous body, Foundation for Innovation and Technology Transfer (FITT), which has been in operation as a formal technology transfer organization since 1992 at IIT Delhi. FITT manages the institute's IPs and IPRs and its gamut of services and activities include, Intellectual Property Management; Facilitate funding for the development of innovative ideas of commercial implication; Transfer of technology relating to proven R&D outputs; and Research partnership with industry for technology development and its commercial applications.

With the aid of IP policy, continuous IP generation process, licensing agreements, industrial consultancy projects, sponsored R&D, collaborative research, technology transfers, well formulated strategies for acquiring, protecting and exploiting the technology developed, IITD generates, protects and exploits IP catering to fast changing market demands across the globe. In this manner, IITD undertakes the management of its IP portfolio subsequent to conducting IP audit and IP valuation on account of the fact that IP audit and IP valuation are integral part of IP management.

It is evident from Table 3 that IPR score of the institution is shooting up which is indicative of the fact that IITD is generating as well as protecting its intellectual creations at a great pace. There are some limitations to the study as research is based on secondary data. The research can be further explored to other academic and research organizations to improve the "framework for IP Audit" developed by Gargate & Jain.

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