EMERGING INTELLECTUAL PROPERTY TRENDS AND ISSUES IN INDUSTRY 4.0

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Abstract

The world has progressed over the years and the wide expansion in the technological arena has led to a different dimension to the emerging trends in various sectors of human expertise. Rapid technological advancement has provided an impetus to rapid intellectual property protection and simultaneously a rise in a stronger intellectual property regime among the intellectual property offices and judiciary across the globe. This paper attempts to study the emerging trends of rapid industrialization, popularly termed as Industry 4.0 comprising vast technological variants from blockchain technology to artificial intelligence and genome and biotechnology patenting trends. This paper also attempts to study the role of examiners and stands taken by Judiciary in India as well as attempts to draw correlation from judicial decisions and examiner examination standards across certain countries, such as Japan, United States, and European Countries. This paper attempts to examine the application of these examination standards in Indian context and provide suggestions for a robust intellectual property protection framework.

Keywords: *Blockchain technology, industrialization, judiciary, artificial intelligence and genome.*

INTRODUCTION

The world has progressed over the years and the wide expansion in the technological arena has led to a different dimension to the emerging trends in various sectors of human expertise. This has led to the progress of human civilization in a mega fold manner which has also raised the questions of whether such technological developments are harmful to us in any way.

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There have been many debates over the past few years over this dilemma and solutions from imposing ban to limited public access have come up. Moreover, there are major issues of powerful organisations hoarding these advancements to have a powerful holdover the market and they generally tend to monopolise the market. In order to infuse the public interest in such technological development and innovation, some incentive must be awarded to the inventors and the public to encourage the spirit of innovation among both the parties. Thus, for such reasons, the system of intellectual property majorly focussing on systems of patent and trademarks are on the rise.

In the recent years, there have been major areas where such kind of innovation has been quite high and this gives an immediate impetus to various patent offices across the globe to build up their expertise and also reclassify the new emerging technologies into the existing domains or to create new methods to scrutinise these technologies. Due to these reasons, it is imperative to identify and shed light on these emerging domains in order to provide better and efficient balance of interests between the inventors and the public.

A major recognition of intellectual property generally took place in the courts of the English rulers who awarded a *Letters Patent*[1] recognizing the achievements of the inventors. This system was developed in the Imperial Courts and later spread on to various countries across the globe. Further, this system took a modern outlook in a codified manner in the US[2] following which many countries adopted this system and recognised intellectual property as an essential right.

Further, development took place post the TRIPS agreement in 1995,[3] wherein significant development in the codification of the patent laws in various countries across the globe. Though this codification gives the freedom to each country to develop their own exclusions, it also creates some uniformity to avoid confusion among the public.

There are few emerging fields which need to be reclassified in the classification of patentable subject matter and thereby provide for easier and smoother transactions. These emerging areas have to be discussed and pondered upon with utmost detailing to avoid any flaws in granting an unworthy patent.

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[1] Micheal Ray, "Letters Patent", Encyclopaedia Britannica, *available at* (last visited on Feb. 01, 2025) https://www.britannica.com/topic/letters-patent .
[2] *Supra* note 1.
[3] World Trade Organisation, "*Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement)*",2017, *available at* https://www.wipo.int/wipolex/en/treaties/details/231.

There are four major areas that have been identified clearly and major datasets across various jurisdictions are adapting to these emergent areas. These areas are identified by Mckinsey as follows:-

1. connectivity, data, and computational power: cloud technology, the Internet, blockchain, sensors;
2. analytics and intelligence: advanced analytics, machine learning, artificial intelligence;
3. human–machine interaction: virtual reality (VR) and augmented reality (AR), robotics and automation, autonomous guided vehicles;
4. advanced engineering: additive manufacturing (such as, 3-D printing), renewable energy, nanoparticles.[4]

These major areas have been reverberating the patenting domain and thus it is essential for each jurisdiction to harbour the essential tools for appropriate conditioning environment to promote such innovations.

1. Emerging Trends in Industry 4.0 in consonance with Intellectual Property protection

1.1 Data Connectivity

The Internet has morphed and modified the digital spectrum in leaps and bounds. Most of the innovations and emerging patents in the domain of internet and connectivity technology specifically deals with data protection, data security and encryption technology. These variations of internet and data connectivity are primarily addressed as blockchain technology.

"*Blockchain can be defined as a distributed database storing a permanent and tamper-proof ledger of data. The key features of said technology are: decentralization, distributed ledgers, consensus mechanisms, immutability of records and encryption. When applied in real-world applications, blockchain potentially enables users to maintain and control the use of their own data such as personal data, contents and transactions by ensuring that this information cannot be altered, copied or otherwise manipulated due to the immutability that blockchain provides*[5]." The concerns for intellectual property protections for blockchain technology was

[4] McKinsey & Company, "*What are Industry 4.0, the Fourth Industrial Revolution, and 4IR?* ", 2022, *available at* https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-are-industry-4-0-the-fourth-industrial-revolution-and-4ir.

[5] World Intellectual Property Organisation, "*Blockchain technologies and IP ecosystems: A WIPO white paper*",2022, *available at* https://www.wipo.int/export/sites/www/cws/en/pdf/blockchain-for-ip-ecosystem-whitepaper.pdf.

first addressed by WIPO by establishing the Blockchain Task Force under the Committee on WIPO Standards (CWS) at its sixth session, held in 2018, with the following mandates:

1. Explore the possibility of using blockchain technologies in the procedures for providing Intellectual Property Rights (IPR) protection, and processing information about IP objects and their uses;
2. Collect information about IP Office (IPO) developments regarding the use of, and experience with, blockchain, assess current industry standards on blockchain, and consider its merits and applicability to IP Offices;
3. Develop reference models for the use of blockchain technologies in the IP field, including guiding principles, common practices, and use of terminology as a framework supporting collaboration, joint projects, and proofs of concept; and
4. Prepare a proposal for a new WIPO Standard supporting the potential application of blockchain technologies within the IP ecosystems.[6]

Although setting standards for blockchain technology with respect to intellectual property protection was a developing task, the Covid-19 pandemic had provided an impetus for blockchain innovations through major focus on data security and data privacy due to rapid data consumption during the pandemic. The pandemic also propelled the glaring challenges in providing sufficient and adequate intellectual property protection to blockchain technology as provided below by the Global Blockchain Council:[7]

1. aligning standards and codes of conduct across jurisdictions and industries
2. ensuring that stakeholders of all sizes have a voice
3. Interoperability concerns across various platforms.[8]

Thus, rapid industrialization and commodification of data has rendered the various forms of intellectual property protection to revise their standards to accord adequate protection.

1.2 Machine learning and artificial intelligence

Another important and sought after field of intellectual property protection is Artificial Intelligence (AI) and machine learning. There is not a single concise definition of AI, however, WIPO has attempted to define AI as "*In recent years, accelerated urbanization, globalization*

[6] *Supra* note 5.
[7] Global Blockchain Business Council, "*Building bridges across web2 and web3 throughеducation, partnerships and standards*", *available at* https://www.gbbc.io/ (last visited on Feb. 01, 2025).
[8] *Ibid* note 5 at Page 51.

and the abundance of products, services and information has begun to fundamentally transform our society. As individuals, we are experiencing an increasingly complex and demanding environment. In response, mobile applications and automated services are being developed, allowing us to more effectively navigate this complex new world. All this is made possible by powerful algorithms that are slowly acquiring fundamental human-like capabilities, such as vision, speech and navigation. Collectively, these computer algorithms are called artificial intelligence (AI). Beyond emulating these ordinary human capabilities, AI is quickly moving forward to master more specialized tasks performed routinely by human experts.[9]"

A glaring trend in AI and machine learning patents is visible in reports published by WIPO which provides the fastest growing AI techniques in terms of patent filings: deep learning showed an impressive average annual growth rate of 175 percent from 2013 to 2016, reaching 2,399 patent filings in 2016; and neural networks grew at a rate of 46 percent over the same period, with 6,506 patent filings in 2016. Furthermore, The growth rates observed in the identified AI-related patent data are noticeably higher than the average annual growth rate for patents across all areas of technology, which was 10 percent between 2013 and 2016[10].

Due to this rapid influx in AI and machine learning patenting, certain challenges were highlighted by WIPO for streamlining protection of AI inventions in 6th to 10th AI conventions, which are follows:

1. Need for more transparency and explainability of AI systems to address issues of patentability, fairness, and accountability. They also called for global harmonization and more clarity in patent application requirements for all types of AI inventions.
2. Revising the requirements of inventive steps because AI makes it easier for a PHOSITA to find a solution to a given technical problem, thus potentially raising the threshold for what can be considered an inventive step. So overall, AI may be shifting both the concepts of enablement and inventive step/obviousness in patent law.

[9] Aristotelis Tsirigos, "*WIPO Technology Trends 2019 Artificial Intelligence*", *NYU School of Medicine*, Dec 31, 2019, *available at* https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf (last visited on Feb. 01, 2025).
[10] *Ibid* note 9 at Page 14.

3. Concerns in lack of IP protection for AI models, the interrelationship between data input and the questions around IP protection for AI output through Generative AI technology.[11]

Thus, these challenges make the conception and assessment of intellectual property protection difficult and challenging in the context of AI inventions.

1.3 Virtual Reality

Virtual Reality has emerged to be a prosperous market which has seen a boom during and after the Covid-19 pandemic. The market of virtual reality and 3D and 4D technology has grown from $279.27 billion in 2018 to $470.86 billion by 2020, at an estimated CAGR of 26.84% from 2014 to 2020.[12] The vast application of virtual reality extends from gaming, E-Commerce, Education and optics. Virtual reality is primarily defined as " *an environment where a person can experience being in a three-dimensional environment and interact with that environment without being physically present in the environment*[13]." Although the rapidity of virtual reality inventions have increased, global IP protections are not at par with the enhanced technological growth. WIPO has identified certain challenges in this area as follows:

1. Enhanced standards of Novelty which makes it difficult for a virtual reality invention to secure IP protection in light of the base technology remaining constant and merely incremental inventions being produced.
2. Increased regulations across the global which are unharmonious and varying in standard and application.
3. Lack of awareness of PHOSITA in understanding nuances of virtual reality inventions[14].

These are the few difficulties and challenges faced in providing sufficient protection to virtual reality inventions through the IP regime.

1.4 Biotechnology and genetic engineering

[11] World Intellectual Property Organisation , "*WIPO Conversation on Intellectual Property (IP) and Frontier Technologies*" , 2022, *available at* https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_conv_ge_2_22/wipo_ip_conv_ge_2_22_3.pdf

[12] LexInnova, "*Virtual Reality: Patent Landscape Analysis*", 2015, *available at* https://www.wipo.int/edocs/plrdocs/en/lexinnova_plr_virtual_reality.pdf.

[13] *Ibid* note 12.

[14] World Intellectual Property Organisation, "*WIPO Technology Trends 2021 Assistive Technology*",2021, *available at* https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055_2021.pdf

These are the technological patents which are filed in the area of innovation and technological development of life sciences. This is considered to be the future of patents next to software patents in AI. This field has become increasingly important in the last few years due to the urgent need of human population to find cure for some deadly diseases such as cancer and HIV. Thus, it is rightly observed that any growth of such biotech patents in the market has eventually grown to necessitate the needs of human civilization. *A recent estimate of the European Commission suggests that by the end of the decade the global biotechnology market could amount to over 2,000 billion Euro. Despite the capital intensity of the industry, the growth rate of the biotechnology industry during the 1990s, and to a lesser extent, the beginning of the 21st century has been impressive*[15]*. The field of biotech inventions generally consists of these innovative areas:-*

1. Pharmaceutical
2. Agrochemical
3. Energy and environmental sectors
4. Molecular biology
5. Molecular medicine
6. Genetic engineering

Thus, these are the major sectors for the growth and development of the biotech industry. But it is of utmost importance to note the reasons for such growth of patent applications being filed in this sector.

The strong growth of the biotechnology industry in recent years has been mirrored by a higher-than-average growth rate for patent applications and patent grants that relate to biotechnology inventions. According to the OECD, the number of patents granted in biotechnology rose 15% a year at the United States Patent and Trademark Office (USPTO) from 1990 to 2000, and 10.5% at the European Patent Office (EPO), against a 5% a year overall increase in patents.4 The growth in the number of patents in the field of biotechnology is largely due to the importance that life sciences and biotechnology companies attach to intellectual property, particularly patents.[16]

[15] WIPO technology trends on Artificial Intelligence, 2019.
[16] WIPO technology trends on Artificial Intelligence, 2019.

Thus, the major reasons are:

1. High investment of profits of biotech company (around 40%) in R&D to develop cure and new drugs in the market.
2. The relative low cost of imitation with respect to high investment in R&D is a major concern. According to the founders of Nordic Biotech, "*the present reality in drug development (……) is that almost any technology or compound can rapidly be reverse engineered".*[17] Thus there is an increased need for IP protection to prevent imitation of such inventions.
3. Most of the biotech companies functions in such a way so as to obtain patents as the end product and thus it is necessary to protect those inventions in order to gain substantial market value of those products.

These factors mostly encourages the biotech companies to invest more into R&D and thereby gain the benefit of successful creation of the drugs. On the other hand, they also aim to secure a quick patent grant in order to incur some profits by selling or licensing these patents to bigger corporations to get value of their patents.

However, certain challenges persists in protecting biotechnology inventions through IP protection:

1. Ethical and legal considerations in protecting genetic and biotechnology variations.
2. Patentability criteria being interpreted across different jurisdictions in different forms.
3. Lack of coherent and harmonious global standards for protecting and creating biotechnology and genetic inventions.[18]

1. Role of examiners and Judiciary in standardising Industry 4.0 inventions to secure Intellectual Property Protection

These innovations are generally introduced by major corporations through their R&D laboratories or by acquiring numerous startups to evolve such technologies. There major

[17] Jenny Andersson, "*State of Medicon Valley 2021: An Analysis of Life Science in Greater Copenhagen*", Medicon Valley Alliance, 2021, *available at* https://mva.org/wp-content/uploads/2021/11/State_of_Medicon_Valley_2021.pdf.
[18] David Castle, "*The Role of Intellectual Property Rights in Biotechnology Innovation* ", Elgaronline, 2009, Page 24-62, *available at* https://www.elgaronline.com/edcollbook/edcoll/9781847209801/9781847209801.xml.

objective to incorporate such changes is to secure a patent grant and thereby exclude other from the market to use the same and gain an impetus in the market. But these changes are too rapid to be accommodated by the patent laws and there needs to be some changes that needs to be incurred to bring law and technology at par.

The major challenges that are faced in the present day scenario due to these rapidly changing technologies are basically three fold as follows:

1. Role of attorneys and their expectation of enhanced expertise.
2. Role of examiners in patent offices.
3. Market implication.

2.1 Role of Attorneys:

The major lacuna that needs to be filled in this sector is to develop the required expertise by the attorneys while drafting the specification and claims of an invention. The major challenges that may be incurred by the attorneys are:

1. Identification of principle feature of the invention.
2. Identification of prior art pertaining to multiple domains of technology.
3. Lack of drafting skills due to inability of understanding the invention properly.
4. Developing a patent strategy to avoid or bypass the restrictions mentioned in the patent Act.
5. Filing in different jurisdictions can be a difficulty as different jurisdictions offer different restrictions and only part claims can be granted in those jurisdictions.
6. There are also difficulties in adjudicating the inventions to identify the infringement area.
7. The role of expert consultation becomes quite expensive for the corporations and for the attorneys as well[19].

2.2 Role of examiners in patent offices:

It is very important to note the role of examiners in determining the various methods of prosecuting the patent application and with the latest introduction of fusion inventions being

[19] Steven E. Adkins, Matthew N. Bathon "Not Mere Litigation: Using the ITC When Infringing Products Have Already Been Imported or Not All of the Importing Competitors are Known", *Ipls State Bar of Michigan Proceedings, Steptoe & Johnson LLP*, 2016, *available at* https://higherlogicdownload.s3.amazonaws.com/MICHBAR/01d50273-4627-4b63-bb74-952aa88baa2c/UploadedImages/pdf/Vol27No1.pdf (last visited on Feb. 01, 2025).

developed it is difficult to scrutinise the patent application single handedly by one examiner who may have expertise only in one particular genre of science and technology. Thus, various patent offices across the globe has taken up the herculean task to scrutinise and adjudicate the patent applications during the examination stage by increasing the efficacy of the examiners.

1. China- The Chinese patent office has incorporated major amendments in the patent law and has introduced a *Chinese Patent Examination Guidelines 2017* which provides various guidelines for Industry 4.0 inventions especially with respect to software patents[20].
2. USA- Similarly, the US patent office has equipped the examiners through classifying them in a particular domain of technological expertise and thereby giving special attention and strict scrutinisation of each patent application. There have been major steps that has been taken for providing skill set and domain expertise to examiners such as, *Patent Enriched Citation Data, Patent CPC Analytics -Trends, Browser Based Endpoint Advanced Analytics for Patents, Trademark Image Classifier, Research Projects at the USPTO*[21].
3. European Union (EU)- The 2024 revisions in the examination guidelines for examiners in EU provides guidelines for examining software patents and also clarifies practice relating to the sufficiency of disclosure requirements for AI and machine learning[22].

Therefore, globally various patent offices are equipping and upskilling patent examination practices for scrutinising Industry 4.0 inventions diligently and also to avoid providing repetitive patent protection for duplicate matters.

2.3 Role of Judiciary:

There have been many controversies which has arisen due to the patentability of blockchain technology and thus there has been another landmark case post Alice which has cleared this confusion and has also iterated that the examiners while rejecting a claim

[20] Toby Mak, "Continental Drift: SIPO's April 2017 Examination Guidelines Bring Significantly Improved Alignment With EU And US Rules In Software And Pharma Fields", Mondaq, May 22, 2018, *available at* https://www.mondaq.com/china/patent/703624/continental-drift-sipos-april-2017-examination-guidelines-bring-significantly-improved-alignment-with-eu-and-us-rules-in-software-and-pharma-fields (last visited on Feb. 01, 2025).
[21] USPTO, "*USPTO Enriched Citation API v2*", 2025, *available at* https://developer.uspto.gov/api-catalog/uspto-enriched-citation-api-v2.
[22] EPO, "*Guidelines for Examination, List of sections amended in 2024 revision* ", 2024, *available at* https://www.epo.org/en/legal/guidelines-epc/2024/m.html (last visited on Feb. 01, 2025).

of blockchain technology stating the reason for non patentable subject matter or lack of novelty, must provide reasons and evidences to the inventor while generating the First Office Action of the patent application.

This has been discussed in the case of *Berkheimer v HP Inc*[23]*.,* which has clearly shifted the pendulum from the earlier decisions and the role of the examiners have been clearly laid out in the area of examination of such software patents.

This case directs to an issue whether combination of additional elements in a claim and the "directed to" claims form a well understood, routine, conventional activity under the test given in the Alice decision. This has been widely discussed and the Court finally reached to the conclusion that[24] "*An Examiner must now support a rejection that asserts that the additional element(s) are well understood, routine, conventional activity with at least one of four different types of specific evidence, such as a document or prior court case showing the conventional nature of the specific additional elements, or the patent application or a prosecution history estoppel acknowledging that the additional elements are conventional. The Examiner may also take Office Notice as well.*

Typically, the Examiner under step 2A will generically define what the claim is "directed to" and leave the more narrow features of the claims to be considered under step 2B as "additional elements". However, the "additional elements" never specifically get identified or even mentioned in detail in the rejection. Office Actions open, in our experience, gloss over the detailed specific limitations of the claim even under step 2B. This has the result of enabling the Patent Office to reject claims without a robust analysis. We see the result of this in a major increase in rejections under Section 101 in art units like Technology Center 3600 (Business Methods)."

This decision will lead to a major implications to the blockchain claims and the genre of cryptocurrencies and scholars thus form the following analysis which indicates towards a robust patenting system in this particular area.

[23] *Berkheimer* v. *HP INC.*, 881 F. 3d 1360.
[24] Dennis Crouch, "*Federal Circuit Outcomes from the Past Four Years*", Patentlyo, Jan 30, 2025, *available at* https://patentlyo.com/ (last visited on Feb. 01, 2025).

Furthermore, in[25] an appeal stems from Covered Business Method (CBM) Review decisions on four related patents owned by TT. The PTAB instituted all four CBM reviews. However, by the time of final decision, two of the challenged patents had been already upheld on eligibility by the Federal Circuit. For those two patents, the PTAB followed the court's lead and found the patents were directed to eligible subject matter. However, claims of the second set of patents were ruled invalid as ineligible and obvious. On appeal, the Federal Circuit took a shortcut. Rather than directly addressing the underlying patentability question, the court vacated the PTAB determinations on jurisdiction grounds. The court held that the *inventions at issue are "technological" and therefore not "covered business methods." Section 18 of the America Invents Act (AIA) creates the "Transitional Program for Covered Business Method Patents." The program, which sunsets in 2020 allows broad challenges of business method patents — including challenges on eligibility grounds. However, the law includes a strict and limited definition of what counts as a "covered business method patent.*"

The term "covered business method patent" means a patent that claims a method or corresponding apparatus for performing data processing or other operations used in the practice, administration, or management of a financial product or service, except that the term does not include patents for technological inventions. In its prior statement on the TT patents, the Federal Circuit ruled that the user interface patents were "directed to a specific improvement to the way computers operate." Here, the court found its prior holding (as adopted by the PTAB) automatically leads to a conclusion that "the patents are also for a 'technological invention' under any reasonable meaning of that term." The Board's holding otherwise, according to the court, is "internally inconsistent and therefore arbitrary and capricious." The result here is that the PTAB does not have authority to conduct a CBM review of these patents because they are "technological."[26]

Therefore, judiciary has played a significant role across the world in setting minimum standards for identification and examination of Industry 4.0 patents which has provided uniformity in local jurisdictions to some extent.

[25] No. 18-1105 (Fed. Cir. 2019)
[26] *Ibid* note 24.

3. Examination standards in Indian context

Just as all the countries are adopting their own standards and mechanisms to identify, examine and provide adequate intellectual property protection to industry 4.0 inventions, likewise India has also adopted various standards and guidelines for adequate intellectual property protection. The Indian Patent office and the Department of Promotion of Industry and Internal trade has formulated various guidelines and standards for examiners of the Patent office for careful evaluation of the upcoming industry 4.0 inventions:

1. Guidelines for Examination of Computer Related Inventions (CRIs), 2017[27]- This guideline for examiners provides standards and examination procedure to be followed for analysing software, artificial intelligence based and virtual reality based inventions.
2. Guidelines for Examination of Biotechnology Applications for Patent, 2013[28]- This guideline for examiners provides standards and examination procedures to be followed for analysing biotechnology, nanotechnology, genetic engineering and DNA technology based inventions.
3. Guidelines for Examination of Patent Applications in the Field of Pharmaceuticals, 2014[29]- This guideline for examiners provides standards and examination procedures to be followed for analysing food and drug inventions and drugs including pesticides and insecticides-based inventions.

Apart from the guidelines set by the patent offices, the Judiciary has also contributed in setting various standards and procedures for the protection and examination of industry 4.0 inventions. Few of the landmark judgements which has set examination standards in India are:

1. Merck Sharp & Dohme Corp v. Glenmark Pharmaceuticals, 2020[30]- The Bombay High Court iterated the compliance of necessary requirements of novelty and inventive step for any pharmaceutical patent and all incremental inventions must also adhere to the standards of novelty, inventive step, and industrial applicability.

[27] Intellectual Property India, "Guidelines for Examination of Computer Related Inventions (CRIs)", (Office of the Controller General of Patents, Designs and Trade marks, 2017).
[28] Intellectual Property India, "Guidelines for Examination of Biotechnology Applications for Patent", (Office of the Controller General of Patents, Designs and Trade marks, March, 2013).
[29] Intellectual Property India, "Guidelines for Examination of Patent Applicationsin the Field of Pharmaceuticals", (Office of the Controller General of Patents, Designs and Trade marks, October, 2014).
[30] *Merck Sharp and Dohme Corporation & Anr.* v. *Glenmark Pharmaceuticals Ltd.* AIR 2013 (NOC) 251 (DEL.).

2. OpenTV v. Controller of Patents, 2023[31]- The Delhi High Court set the standard that narrowing of claims during examination by taking support of disclosure provided in the complete specification is allowed, however the broadening of the scope of the claims is not allowed.
3. Allergan Inc v. Controller, 2023[32]- The Delhi High Court allowed the amendment of "method of treatment" claims to "product" claims, emphasising that amendments should consider the complete specification, not just the pre-amended claims.

Thus, the Indian government and the Indian judiciary has equipped and upskilled its examiners and has provided updated guidelines with changes in the technology domains in consonance with the global standards.

Conclusion

Thus, from the above discussion we can conclude that major changes are bound to make the industry more efficient and effective after the revolution of industry 4.0, but simultaneously it is also a herculean responsibility on the patent offices to scrutinise these applications and thereby develop expertise in cross breeding areas to examine these applications. It is also noteworthy that our future includes a confluence of technology where the machines become the part and parcel of human lives. The major challenge in the upcoming future for the examiners and the patent offices is to actually dissociate the point where the invention is created by human or a machine. It will also be a challenge to identify the intellectual mettle of humans and differentiate the same with the creativity of an AI. Furthermore, with the ease of accessibility of information becoming faster and easier, the intellectual contribution and role of a person skilled in the art is also being challenged by influx of AI tools which renders the functioning of the patent offices to update and upgrade with the changing times.

[31] *Opentv Inc* v. *The Controller of Patents and Designs* C.A.(COMM.IPD-PAT) 14/2021.
[32] *Allergan Inc* v. *The Controller of Patents* C.A.(COMM.IPD-PAT) 22/2021.