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COMPUTER RELATED INVENTIONS: IMPLICATIONS FOR MSMEs, STARTUPS AND RELATED EMERGING ISSUES IN INDIA

Yuvaraja .A
Research scholar, Bharath Institute of law, Bharath Institute of Higher Education and Research, Selaiyur Chennai.

Dr. Nageswara Rao.A
Associate professor of law, Bharath Institute of Higher Education and Research, Selaiyur Chennai.

Abstract

The invention of the computer leads to the automation of every day-to-day work and reduced the time frame of the various activities of human beings. Nowadays the MSMEs and Startups plays vital role in contributing the Indian economy. The invention of machine-readable language, algorithms, and software of the computer has made the world enter into the information technology era. Hence the states of the various jurisdictions have made more investments in research and development to make the improvement in the existing technology and to invent new technology in both areas of the computer that is hardware and software. For this huge investment, time, and skill, there must be some benefits and protection to be given to that person us well as the small industries like MSMEs and Startups in India. The protection of the invention is thus provided under intellectual property law through patent law, copyright law, and semi-conductor layout design law. Thus, the hardware component and software component of the computer is collectively referred to as computer-related inventions (i.e. CR invention). Here in this paper, we will analyze the emerging issues that have been faced by the MSMEs and Startups in protecting the Computer related invention under the patent law in India. Further here we have extended our discussion how the Artificial Intelligence (AI) and BlockChain technologies have invented and protected by the MSMEs and Startups in contributing the growth of the Indian economy. Specifically here in this article has been concentrated in the Indian jurisdiction, how the industries like MSMEs and Startups influenced the claims of Artificial Intelligence (AI) under patent law and the emerging issues involved in their protection.

Keywords: *Patenting of Computer Related Inventions, MSMEs, Startups, Artificial Intelligence (AI), BlockChain Technology, etc.*

1. INTRODUCTION

In the development of any country, the role of its domestic industries is of primary importance as they are the major force in creating a robust economic structureand they also cater to the needs of the general public. In India, this role is played by itsMicro, Small and Medium Enterprises (MSMEs) and Startups which not only contribute to the economy and

employment generation, but are also an important catalyst for innovation generation in the country. Today's world is information driven where the utilisation and commercialisation of knowledge plays a critical role in development and growth of a society. In the utilisation and protection of knowledge, patent plays a key role, helping MSMEs and Startups to commercialise their inventionswithout the fear of unauthorised appropriation by the rivals.

As the country is striving towards digitisation, more and more innovations are expected to come from these two sectors in the field of computer-related inventions, particularly from the Startups. Their role would be important not only from an economic point of view, but also from a social point of view as these sectors are more connected with the local population, innovation in the field of computer technologies could be very well directed towards solving local problems. A supportive patent regime for MSMEs and Startups in general and for computer-related inventions in particular could help in not only providing proper motivation but would also help in diffusing technology and knowledge at the lowest level of the economy.

The rise of new technologies like Artificial Intelligence (AI) and Blockchain, which comes under the ambit of computer-related inventions have not only presented new avenues of innovation but have also created new challenges for the patent regime in the context of subject matter eligibility. These emerging technologies have already caught the attention of Startups, who are investing heavily in these technologies to create products and services. As more and more innovations will come up in these emerging technologies, there would be a rise in the demand for patent protection by MSMEs and Startups for their creations.

With the amount of resource being poured in these technologies, it becomes important from the Indian perspective to make sure that the patent law in the context of computer-related inventions and emerging technologies is aligned with the interests of MSMEs and Startups.

Here we are going to see the role of MSMEs and Startups in the Indian economy, their importance in creating a strong ecosystem of innovation in the country and how patents could help them in establishing themselves by proper utilisation of theirinnovations and knowledge. The chapter also examines the challenges the emerging technologies are putting up to the existing patent regime and how Utility models patentscould emerge as a possible alternative for MSMEs and Startups for protecting their innovations, particularly in the context of computer-related inventions.

2. MSMEs and Startups in India

The classification of Micro, Small, and Medium Enterprises has been enumerated in The Micro, Small, and Medium Enterprises Development Act, 2006. This Act was promulgated with the objective of promoting, enhancing, and developingthe competitiveness of these enterprises. According to the Act, the criteria for being classified as a Micro Enterprise is

that the investment in Plant and Machinery must notexceed one crore rupees and the turnover must not exceed five crore rupees. For SmallEnterprise, the criteria state that the investment in the plant and machinery must not exceed ten crore rupees and turnover must not exceed fifty crore rupees and for MediumEnterprises, the investment in plant and machinery must not exceed fifty crore rupees and turnover must not exceed two hundred and fifty crore rupees[1]. The importance of MSMEs can be ascertained from their significant contribution towards economy whichaccording to the Economic Survey of 2021-22, stands around thirty-three percent of thetotal Gross Value Added (GVA)[2] in the year 2019-20[3]. The share of MSMEs in the total Gross Domestic Product (GDP) of the country also stands around thirty percent[4]. It accounts for almost forty percent of the total exports in the country and is responsiblefor creating around eleven crore jobs in both the rural and urban areas across the country. There are around six crores thirty-three lakh MSMEs in India in which the Micro Enterprises garner the lion's share of almost ninety-nine percent of the total enterprises in India, after which comes the Small Enterprises and lastly the Medium Enterprises. They have provided a cushion to the Indian economy from adversities and global shocks.

The Startups, on the other hand, are being managed through Government initiated program called the "Startup India" initiative which is aimed at building a strong eco-system of Startups in the country. This initiative intends to nurture innovation in Startups so that they can drive economic growth and create large-scale employment opportunities[5]. The Department for Promotion of Industry and Internal Trade (DPIIT), which comes under the Ministry of Commerce and Industry has been tasked to manage and implement this initiative by coordinating with various other departments and organs of the Government. An entity is considered as a Startup up to a period of ten years from its incorporation if it is incorporated as a private company orregistered as a partnership firm or limited liability partnership in India. The turnover ofthe entity must not exceed a hundred crore rupees in any of the financial year since its incorporation or registration. The entity must be working towards innovating, developing or improving products, processes or services or it must be a scalable

[1] The Gazette of India: Extraordinary, Ministry of Micro, Small and Medium Enterprises Notification 1st June, 2020, *available at*: https://msme.gov.in/sites/default/files/MSME_gazette_of_india.pdf (lastvisited on June 15, 2022).
[2] Gross Value Added (GVA) refers to rupee value of goods and services produced in the economy afterdeducting the cost of raw materials and inputs used. It is a measure of contribution to Gross DomesticProduct by a sector.
[3] Government of India, "Economic Survey 2021-22" 282 (2022).
[4] Ministry of MSME, "Annual Report 2020-21" 22 (2022). Gross Domestic Product (GDP) measuresthe monetary value of all the goods and services produced within the borders of a country.

[5] Government of India, "Start Up India Action Plan, 2016" 2, *available at*: https://www.startupindia .gov.in/content/ dam/invest-india/Templates /public/Action%20Plan.pdf (last visited on April 23,2022).

business model with the potential of high employment generation or wealth creation[6]. However, an entity that is formed as a result of splitting up or reconstruction of an existing business shall not be considered as Startup.

The Startups in the country have seen a significant rise in the last five years. India has the third largest Startup ecosystem in the world after China and the United States of America. According to the Economic Survey Report of 2021-22, more than sixty-one thousand Startups have been recognized in India till January 10, 2022, in which more than fourteen thousand Startups were recognized in 2021 only as compared to paltry seven hundred and thirty-three Startups in the year 2016-17. The Startups inthe country have generated more than forty thousand jobs over the years with the year-over-year growth rate of the Startup ecosystem expected to hover around fifteen percent. The Startup ecosystem alone has given rise to four lakh direct jobs with over sixty thousand jobs in the year 2019 only. India is also home to hundred such Startupswhose valuation in terms of their growth potential as perceived by the investors has reached hundred crores, such Startups are called "Unicorn Startups"[7]. From a developing country's perspective, Startups play a key role in developing feasible business models which generate innovative ideas and solutions directed towards achieving sustainable growth and industry-wide solutions.

In making MSMEs and Startups successful, it is important for them to not onlycater to the demands of the consumers but also to capitalize and monetize knowledge and use it to innovate and strengthen their position in the market which would lead to stability and longer survival in this era of cutthroat competition. The advancement of science and technology has changed the nature of the economy worldwide from what was earlier dominated by agriculture and industry, to the monetization of knowledge. Safeguarding of knowledge and how it can be turned into wealth are now becoming

some important concerns for these sectors of the economy. The emergence ofknowledge-based economy has created an economic environment where management and utilization of knowledge play a key role in wealth creation, making the traditional factors of production like labour and capital less important[8]. A knowledge-based economy is one that creates, disseminates, and utilizes knowledge to enhance the development and growth of the economy and the country[9].

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[6] Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade) Notification 19th February, 2019, *available at*: https://www.startupindia.gov.in/content/dam/invest- india/Templates/public/198117 .pdf (last visited on April 23, 2022).

[7] Saurabh Kapoor, "what is a unicorn and what does it take to become one?", *The Indian Express*, June2, 2022, *available at*: https://indianexpress.com/article/explained/everyday-explainers/explained- what-is-a-unicorn-and-what-does-it-take-to-become-one-7944468/ (last visited on June 18, 2022).

[8] Rashmi Gujrati, "The role of intellectual Property for SMEs, Innovation and Economic Growth in India" 5 (7) *International Journal in Management and Social Science* 80 (2017).

[9] World Bank (Report No. 31267-IN), "India and the knowledge Economy Leveraging Strengths and Opportunities" April 2005, *available at*: https://openknowledge.worldbank.org/handle/10986/8565 (last visited on February 15, 2022).

Proper utilization of knowledge not only results in wealth generation, but also acts as a catalyst for innovation in the society which is important not only from an economic point of view but also from a social development point of view. Innovation plays a critical role in the survival of firms and economic growth and one of the key factors in driving innovation is knowledge that could be indigenous or acquired over aperiod of time[10]. One cannot deny the fact that MSMEs and Startups have a critical rolein bringing innovative products and techniques to the market. However, if the knowledge is freely appropriated by competitors, then it could lead to improperapplication and protection of knowledge which could further dampen the prospects of innovation in a country. The system of patents, therefore, plays a crucial role in not onlycombating the problem of free appropriation of the knowledge but also provides an impetus to innovation by assuring certain benefits to the knowledge creators. It is therefore essential to look into the role patents play in the growth and development of MSMEs and Startups.

3. ROLE OF PATENTS FOR MSMES AND STARTUPS

The role of patents become more critical in today's economic environment which has shifted more towards technology and knowledge-based industries, leading to an increased reliance on intellectual assets as an important tool of competitive advantage.This stands particularly true in the case of Startups that are mostly in the knowledge- based sector and where patents have a key role to play. Patents provide exclusive property rights over the implementation of knowledge into useful inventions and innovations. Such exclusive rights under patents would provide the right motivation towork upon new products without the fear of any appropriation of the knowledge underlying the products. The rights provided by a patent is an effective motivator to work upon developing new knowledge and its production. Apart from the traditional role in securing the knowledge and inventions from appropriation and providing an incentive to the inventor, the patent also helps in making sure that the knowledge behindan invention is disclosed in the patent application to the general public. The patent is an agreement between the government and the patentee where in return for a limited period of exclusive rights, the patentee is required to disclose the invention which couldhelp in the diffusion of knowledge in the economy. Disclosure of knowledge leads to further expansion of the knowledge base and reduces redundancy, allowing the replacement of older knowledge with newer ones.

Patents also provide a shield to small enterprises against the claims of alleged infringement by asserting their own patents as a counterclaim against the plaintiff,

levelling the playing field for the small entities. A strong arsenal of patents could prove to be beneficial, particularly in the case of MSMEs and Startups in preventing litigation.

[10] Debanjana Dey, "Are small sized firms really innovative? Understanding the Indian Scenario" 112 (6) *Current Science* 1121 (2017).

Large firms could easily get into cross-licensing agreements as they are repeat players constantly engaged in market-related activities, it is easier for them to settle disputes without going into litigation. Small firms on the other hand, are new to the market and are without any means of coordination that is available to big firms, hence acquiring a patent could very well serve as a defence from patent infringements[11].

If a small firm is accused of infringing a patent in a product, then it can file a counterclaim against the plaintiff, accusing him of infringing any of its patents that is covered by that product. Such counterclaiming raises the likelihood of an out of court settlement, which is desirable for small firms and Startups. Lastly, patent helps Startups in creating an image of an entity that places importance and value on their ideas. Patent is a kind of validation that a particular Startup is serious with respect to itsknowledge and innovation development. That is why many firms use the words "Patent Pending" while disclosing their products, emphasizing the superior quality of the product. Such image building helps in marketing the product and creating brand valuefor the Startup. Another important function patent may perform here is that it could bea signal to potential investors regarding the technical competence of the Startup.

4. MSMES AND STARTUPS PATENTING TREND IN INDIA

There has been a significant rise in overall patent applications filings in the country which according to the Annual Economic Survey stood at 58,502. As per theData released by the Ministry of Commerce and Industry, the total patent applications filed in the year 2021-22 stood at 66,440 showing an increase of around 13% over the previous year which stood at 58,502[12]. The Data also highlighted that in the Quarter ofJanuary and March 2022, the patent filing by the Indian Patent applicants for the first time in eleven years surpassed the number of applications filed by the non-Indian applicants. Out of the 19796 applications filed in the Quarter, 10706 belonged to domestic applicants while 9090 belonged to non-Indian Applicants. The filing of thepatent applications by Indian applicants has constantly been on the rise in the previousyears also. As highlighted by the Annual Report published by the Office of Controller General of Patents, Designs, Trademarks (CGPDTM), in the year 2019-20 also the patent applications filed by Indian Applicants showed a growth of over 22% when compared to applications filed in the year 2018-19[13]. This shows that the patent filing by Indian Applicants is constantly on the rise, showing a positive growth trend. As far as the Startups and MSMEs are concerned, the patent applications filed by them are constantly increasing from the year 2016-17 to 2019-20, indicating a positive patenting trend in the MSMEs and Startup ecosystem. According to the AnnualReport, the Indian startups

[11] Stuart J.H. Graham and Ted Sichelman, "Why do Start-Ups patent?" 23 (3) *Berkley Technology LawJournal* 1065 (2008).

[12] Ministry of Commerce and Industry, Press Release, April 12, 2022, *available at*: https://pib.gov.in/PressRelease Page.aspx?PRID= 1815852 (last visited on June 20, 2022).

[13] Office of the Controller General of Patents, Designs, Trademarks and Geographical Indications India"Annual Report 2019-2020", p.no. 20 (2021).

filed 1650 patent applications in the year 2019-20 as compared to 801 patent applications filed in the year 2018-19, showing an increase of over a 100%. Although, the patent applications filed by Indian Small Entities in the year 2019-20 stood at 576, showing a decrease of around 5% when compared to the previous year's filings. The number of patents granted stood at 30,074 in the year 2021-22, showing an increase of around 5% over the previous year's figures which stood at 28,391. However, if looked at from an overall perspective, the patentecosystem in India has been showing positive signs, particularly in the case of MSMEsand Startups that have shown remarkable growth in the last five years.

To promote and nurture the patent ecosystem in the Startups and MSMEs, certain initiatives have been taken by the Government to make sure that these crucial sectors of the economy are able to sustain in this competitive economy by protecting their innovative ideas through patents. In 2016, the Government released National Intellectual Property Rights Policy with the aim of creating a dynamic and balanced intellectual property rights regime in India. While underlining the importance of innovation and creativity in the development of a knowledge economy, the policy aimsto foster innovation and promote entrepreneurship by creating a vibrant and balanced intellectual property rights system[14]. From the perspective of MSMEs and Startups, the policy talks about spreading awareness and promotion of Intellectual property rights inthese sectors including tailoring patent programs specifically for these sectors. The policy under one of its objectives of stimulating the generation of intellectual propertyrights talks about incentivizing the filing of patents by MSMEs and Startups by facilitating domestic filings. The policy also focuses on promoting the commercialization of intellectual property rights by providing facilitation centres and services to MSMEs and Startups for the said purpose and encouraging them to commercialize in foreign countries also. The policy aims at creating an ecosystem where Government agencies and various sectors of the economy collaborate with eachother in fostering an innovative conducive environment which facilitates the creation of a knowledge-based economy.

In the light of the objectives laid down in the above policy, the Government hastaken certain steps for promoting patenting in the MSME and Startup sectors of the economy which are aimed towards incentivizing innovation in technology and other sectors. The Ministry of MSMEs introduced a scheme for building awareness of intellectual property rights for the MSMEs which provides for assistance to MSMEs inobtaining intellectual property rights so that they could protect their ideas and enhancecompetitiveness. Under this scheme, Government shall provide a one-time financial assistance to a registered MSME, of Rupees one lakh on the grant of a domestic patentand Rupees Five Lakh for a foreign

[14] Ministry of Commerce and Industry, Department of Industrial Policy and Promotion, "National Intellectual Property Rights Policy 2016", p.no. 1, *available at:* https://dpiit.gov.in/sites/default/ files/national-IPR-Policy2016-14 October2020.pdf (last visited on January 15, 2022).

patent. The objective is to encourage MSMEs tofocus on protecting their innovation and invest more in research and development.

The scheme also provides for providing financial assistance of up to Rupees oneCrore for the purpose of setting up Intellectual Property facilitation centres for MSMEso that entrepreneurs could have access to the best practices with regard to identification of intellectual property tools and technologies and management of their intellectual property portfolio. Similarly, under the 'Startup India' initiative launched by the Government of India in 2016, the applications of Startups shall be fast-tracked for recognized Startups. It further envisages establishing of panel of facilitators in the country who shall provide general advice to the Startups on different aspect of intellectual property rights.

Under the Scheme for Facilitating Startups Intellectual Property Protection (SIPP), any Startup can register for accessing high-quality intellectual property facilitators whose function would be to provide every possible assistance in the field ofintellectual property from general advice to contesting opposition. The objective of thescheme is to nurture and mentor emerging technological innovations in the Startups and assist them in commercializing and protecting it by providing intellectual property related services[15]. Under this scheme, a panel of facilitators shall be made under the guidance of CGPDTM and the Startups shall not pay any fees to the facilitators, the fee shall be paid by the Central Government through the office of CGPDTM. Apart from the above schemes, the Government has introduced certain important changes in the Patent Rules keeping in mind the interests of these two sectors. Under Schedule 1 of the Rules which contains fee to be paid by applicants at different stages of their application, the MSMEs and Startups have to pay 80% less fees when compared to other applicants. Also, under Rule 24C of the Patent Rules, MSMEs and Startups areeligible for filing a request for expedited examination of their patent applications[16].

The Ministry of Electronics and Information Technology (Meity) has introduced a policy called National Policy on Software Products which aims at buildinga robust software product industry in India with the help of academia, industry coveringboth MSME and Startups and, the Government. The Policy is driven by among other things, innovation and sustainable intellectual property. The vision, as described by the policy is to develop and produce intellectual capital driven software products. Thepolicy mainly aims at building entrepreneurship and innovation ecosystem with respectto software products by allocating funds to industries and academia for development and research and innovation in software products. The above schemes and changes brought in by the Government show the

[15] Scheme for Facilitating Startups Intellectual Property Protection (SIPP), *available at*: http://ipindia.gov.in/writeread data/Portal/News/680_1_SIPP_extension_as_approved_by_SIIT. pdf (last visited on June 22, 2022).
[16]The Patents Rules, 2003, rule 24C.

importance it attaches to the creation of intellectual property and its role in creating and disseminating innovation in today's knowledge and technology-based economy.

5. UTILITY MODELS PATENTS– A VIABLE ALTERNATIVE TO PATENT FOR STARTUPS AND MSME

Utility Models Patents are short-term patent rights granted for inventions that lack the same degree of inventiveness which is required by the general patent law. Sincethey do not fulfil the substantive requirements of inventive step as required by the PatentLaw and usually, they are given without any substantive examination, they are also called as 'weak patents'. WIPO defines Utility Models Patents as "A utility model system provides protection of so called "minor inventions" through a system similar tothe patent system. Recognizing the minor improvements of existing products, which does not fulfil the patentability requirement, may have an important role in a local innovation system, utility models protect such inventions through granting an exclusiveright, which allows the right holder to prevent others from commercially using the protected invention, without his authorization, for a limited period of time." Thus, thissystem is a kind of second-tier patent protection system which provides a cheap and relatively faster protection to those technical inventions which fall short of the strict patentability criteria[17]. Utility Models is known with different name in different jurisdictions like in France it is called 'utility certificates' in Belgium they are known as 'short term patents' and in Malaysia they are called 'utility innovations'.

Around seventy countries have second-tier patent protection which resembles the Utility Models Patents in some form or another. Utility models has been recognized as one of the objects of industrial property under the Paris Convention of 1883. Apart from mentioning it, nowhere it defines the meaning of utility models norspecifies its scope but merely confirms that principles enumerated under the convention, would be applicable to utility models also. The TRIPs agreement of 1994 does not openly mention utility models but by virtue of its article 2(1), pertinent provisions of the Paris convention are extended to all WTO members including article1(2) of the Paris Convention. The term utility model has no uniform definition due tothe fact that it does not have a uniform applicability throughout the world and therefore,its meaning changes from country to country. However, there are certain basic characteristics of utility model patents that are more or less similar in the countries in which it is applicable.

In the context of computer-related inventions also, Utility Models can help in creating innovation as most of the software-related inventions are incremental in natureand since the innovation in the field of emerging technology will be more widespread,the MSMEs and Startups would be encouraged to take up innovations in the area of such

[17] Graham Dutfield and Uma Suthersanen, *Global Intellectual Property Law* 179 (Edward Elgar Publishing Ltd., 2008).

technologies. Keeping in mind the short life of digital technology innovations andthe rapid pace with which innovative technologies are replacing existing ones, Utility Models will also help in keeping up with rapid technological changes by providing lower duration of protection, keeping the innovation process on its toes. Utility Modelscan surely help in cutting the delay in grant of patents and can help in commercializingof inventions by the Startups and MSMEs which would not only help in building a strong economy but also a healthy and robust innovation ecosystem in India.

As we are witnessing rapid changes in the technology arena, particularly in computer technologies, a growing challenge to existing patent regimes particularly in the area of subject matter eligibility is rising in the field of emerging technologies, particularly in the fields of AI and Blockchain. These emerging technologies are now becoming the new area for innovation and growth, particularly in the Startup ecosystem. The rise in innovation would simply mean more patent filings, therefore it is important to look into what these technologies actually are and how they shall be judged on the subject matter eligibility front in the current patent paradigm.

6. CHALLENGES OF EMERGING TECHNOLOGIES: ARTIFICIAL INTELLIGENCE &BLOCKCHAIN

The computer technologies are increasingly becoming more sophisticated and integrated into the societies, resulting in the transformation of domestic and global economies. The unprecedented rise of these technologies has opened a new phase in the history of human development. These technologies have the capability of not only replacing the incumbent technologies but also transforming the lives of individuals andthe global society at large. Klaus Schwab describes the rise of these technologies as theadvent of the "Fourth Industrial Revolution" which, like the previous industrial revolutions shall transform industries, facilitate the emergence of new business models,and more importantly, would have a profound impact on the way society functions andcommunicates with each other. What makes this Fourth Industrial Revolution different from other revolutions is the fact that the speed of development and diffusionof innovation fostered by these technologies is faster than ever. While the spindle wheel, which was the symbol of second Industrial revolution, depicting the rise of mechanical power over muscle power took around one hundred twenty years to spreadoutside Europe, the Internet spread across the world in less than ten decades.

Although, despite these technologies being at a very nascent stage, they are already challenging the traditional paradigms of patent law. AI and Blockchain technologies are getting widespread global recognition and are now being increasinglyutilised in computer-related inventions, which exacerbates the already difficult situationpatent regimes are facing with respect to providing patent protection for computer- related inventions. It is pertinent to analyse these technologies from the viewpoint of patent law and how their advent has impacted the patentability criteria of the computerrelated inventions, keeping in perspective

the interest of MSMEs and Startups which are heavily investing in these technologies for creating new and innovative products and services.

7. Artificial Intelligence (AI): Challenges for Patent Law

The fascination of humans with the concept of an autonomous machine capableof carrying out tasks without any human intervention is not new. Glimpses of it could be found in mythologies and science fictions where there have been references to suchmachines, for instance, the Greek poet Homer described in his poem "lliad" written in8th century B.C, a self -assembling tripod machine created by God Hephaestus[18]. Science fiction writers like Jules Verne and Isaac Asimov have written quite a bit aboutthe possibilities of an intelligent machine that is capable of emulating human intelligence or even surpassing it. It could be said that these fictional references servedas an inspiration for the present quest for AI. The term AI was for the very first time coined by John McCarthy at the Dartmouth College Artificial Intelligence Conferenceheld in the year 1956 at the Dartmouth College, New Hampshire where he defined AI as the "science and engineering of making intelligent machines." However, this definition does not actually define what AI is but sheds light on the objective of AI which is to create a machine that could simulate human intelligence. The term AI is made of two words 'Artificial' which in general parlance means something which is not natural but man-made and 'Intelligence' means efficient and effective thinking[19]. Thus, it could be said that AI is a study of making computers do things that currently, people do better.

The potential application of AI in diverse fields has broadened the application of computer technology into those areas which were in the past, associated with deep human intelligence. A Startup is offering an AI driven machine that, on the basis of previous medical data identifies patients most at risk and also predicts the best treatmentprotocols for them. The engineers in Hitachi programmed a computer that independently with the help of AI, designed a new nose cone for bullet train which reduced the noise and vibration levels of the train and improved the aerodynamics of the train[20]. From facial recognition for criminal detection and crime mapping, to self-driving cars, automated recommendations on social media and speech recognition, thepresence of AI is now ubiquitous.

From healthcare to improving businesses, due to these endless possibilities and applications presented by AI, it has become a global phenomenon and is poised to become one of the main drivers of the global economy. According to a report, AI is estimated to

[18] Paul Schydlo, "Chapter 1: Imagination -Birth of Robotics", *available at*: https://medium.com/human-robots/chapter-1-imagination-birth-of-robotics-c03091ce1b33 (last visited on May 25, 2022).

[19] Stephen Lucci and Danny Kopec, *Artificial Intelligence in the 21st Century: A Living Introduction* 6(Mercury Learning and Information, 2nd edn., 2016).

[20] Ben Hattenbach and Joshua Glucoft, "Patent in an Era of Infinite Monkeys and Artificial Intelligence"19 *Stanford Technology Law Review* 35 (2015).

contribute around 15.7 trillion to the global economy, increasing the globalGDP by around 14% by the year 2030. From the Indian perspective also, AI is playing a crucial role in the development of the Startup ecosystem in India. AI is now being used by more than 50% of the Startups, showing the rising penetration of this technology in the Startup ecosystem in India. More importantly, nearly 63% of the computer technology-based Startups are leveraging AI to build solutions for thedomestic and global markets. Also, India is ranked Eighth in AI patents worldwide and Fourth in the number of scholarly papers published on AI.

AI has, on the one hand, enabled the creation of new models of creativity and innovations in the society and on the other hand, raised certain challenges for the existing patent regime particularly on the patentability and inventorship front which requires the attention of the policymakers. Since one of the goals of patent law is to encourage innovation and enrich society with the benefits of these innovations and knowledge behind such innovations, the rise of AI and its importance in globaleconomy add a new dimension to the patent eligibility jurisprudence of computer- related inventions. AI essentially falls under the category of computer-related inventions, the reason being that like any other computer system, the working of AI is directed by the algorithms written by humans for it. AI machines create an illusion as if it they are working autonomously, but their actions are completely dependent on thecomputer program that humans wrote for it[21]. Thus, the assessment of patent eligibility of inventions involving AI shall be done on the same standard which is applicable to other computer-related inventions.

In India, the subject matter is given under section 3 of the Patents Act whichcontains an exhaustive list of things that are not considered inventions under the Act. With respect to AI, clause (k) of section 3 is important since it excludes mathematical method, business method, computer program *per se* and algorithms, which are subjectmatters related to computer-related inventions. These exclusions have to be read under the light of the Guidelines for Examination of CRI 2017, which were brought to bring out clarity with respect to the exclusions under section 3(k) so that the computer relatedinventions could be assessed properly. As far as AI inventions are concerned, since theguidelines state that the inherent substance of the invention, not its form is important for establishing patent eligibility in the context of computer related inventions, it can be said that if an AI claim as a whole, in substance, does not fall in any of the excludedcategories then, it is eligible for a patent. If an AI claim consists purely abstract mental act or mental skill without demonstrating any practical application, or it is in substance a business method or an algorithm only, then it shall not be patentable.

[21] Sonia K Katyal, "Private Accountability in an Age of Artificial Intelligence", in Woodrow Barfield (ed.), *The Cambridge Handbook of The Law of Algorithms* 51 (Cambridge University Press, US, 2021).

Same goes for claims directed to computer programs, which shall be excluded from patentability if in substance are directed solely to a computer program or computermemory with instructions or other similar categories. The Guidelines do not explainwhat constitutes the substance of an invention and fails to provide any guidance as to when it could be said that an AI in substance contains something more than the excludedsubject matter. The lack of illustrations further exacerbates the situation, providing no definite guidance as to the patentability of AI inventions under the guidelines.

Along with the inventorship is the issue of liabilities in case of infringement by AI because legal personhood not only results in the conferral of rights but also entails legal obligations[22]. Since AI machines will not only be used by developers for researchbut also for commercial purposes, to what extent would the liability would go in case of AI inventing something which infringes others patent rights is a question yet to be decided. Since AI machines are self-learning machines, they may in the future becomeless and less dependent on humans. The call for legal personhood is based on the argument that it would protect creators from unintentional or unplanned actions of the AI system which could be due to programming errors, hacking, or unexpected operations resulting from self-learning system. Who shall be held responsible for infringement that occurred because of the actions of AI machine, whether it should be the user of AI or the developer or the AI itself, are some difficult questions from both legal and ethical point of view.

One way to deal with the above issue is to separate ownership from inventorship, and restrict ownership to human agents or legal entities only so that in a case when the question of liability arises with respect to infringement by AI, then therewould be no confusion as such. At present, the best course is to treat AI machines as atool and not allow AI machines independent inventorship as the current stage of such machines still require some control or input from human beings. This would not only avoid unnecessary ethical and legal issues but would also help in bringing clarity in terms of the application of Patent Laws.

8. Blockchain Technology and Startups

Blockchain is yet another emerging technology that is increasingly changing thebusiness landscape around the globe. It has become one of the most sought-after technologies and big companies are scrambling to incorporate them into their businesses. Its importance in the Indian Startup Ecosystem could be ascertained fromthe fact that 16 percent of Tech Startups are leveraging Blockchain technology and it remains one of the fastest growing sub-sectors of the Startups ecosystem globally.Blockchain is decentralized, time-stamped digital ledger system which is based upon peer-to-peer network and is secured by

[22] Eliza Mik, "AI as a legal person?", in Jyh-An Lee, Reto M. Hilty, *et.al.* (eds.), *Artificial Intelligenceand Intellectual Property* 434 (Oxford University Press, UK, 2021).

encryption[23]. In other words, blockchain represents a transparent record keeping system that is tamper resistant and does not have a central authority to regulate but is regulated by the community of the users who are on the blockchain network. Each block that contains transaction information is chained with the previous block using cryptography and trust mechanisms, without anyneed of a central authority.

The credit of popularizing blockchain technology goes to Satoshi Nakamoto's seminal paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System" which introduced to theworld cryptographic proof-based electronic payment system, where transactions could happen directly between two parties without involving a trusted third party. Although, the name Satoshi Nakamoto is a pseudonym and the real identity of the author of the paper is still unknown, the paper introduced a peer-to-peer network-basedpayment system that records the transaction in a cryptographically secured block whichis time stamped, and each transaction is broadcasted to all the nodes and can be acceptedin a blockchain only when the majority of nodes approve it. Although the core technologies such as time stamping underlying the Blockchain system are not new andhave been discussed way back in the year 1992[24], the credit to encompass all these technologies on a single platform and making it financially lucrative to maintain all thecopies of the ledger goes to Nakamoto.

Since the system is decentralized, it uses self-executing computer codes, whichcome into action once the required conditions are fulfilled. These codes are called 'smart contracts' which are a collection of codes and data that is implemented using signed transactions that are cryptographically secured on the blockchain. Nick Szabo,who coined this term defines a smart contract as "a computerized transaction protocol that executes the terms of a contract. The general objectives of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries."[25] The idea behind these intelligent contracts is that the contracts could execute themselves autonomously, eliminating the need of an executing third party. In a coffee vending machine, *if* youinsert the required money *then* the machine shall dispense coffee, which represents the most glaring example of the principle behind working of a smart contract. To put it more simply, the smart contract work on the "if-this-then-that" scenarios, which are validated and enforced by the computer codes ensuring truthfulness and lack ofmiddlemen ensures efficiency in terms of time and cost.

[23] B P Singh and Anand Kumar Tripathi, "Blockchain Technology and Intellectual Property Rights" 24 *Journal of Intellectual Property Rights* 41 (2019).

[24] Dave Bayer and others, "Improving the Efficiency and Reliability of Digital Time Stamping" *available at*: https://www.math.columbia.edu/~bayer/papers/Timestamp_BHS93.pdf (last visited onMay 12, 2022).

[25] Nick Szabo, "Smart Contracts", *available at*: https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart. contracts.html (last visited on May 12, 2022).

Blockchain technology is expected to have a huge impact on the financial technology sector, especially in the banking and insurance industries which are increasingly looking towards adopting this technology for faster business transactions and keeping safe records of their customers. Even the governments are also showing interest in using blockchain technology to regulate and record land registries and farm registries in e-governance. In one of the aims enumerated by the National Strategy on Blockchain document, is to contribute towards intellectual property rights creation. Due to its potential in the financial industry, many big banks and financial institutions are lining up their blockchain innovations for patenting. The trend is visible in the overall increase in the patent filing regarding blockchain over the past five years.

In India, like the UK, there is a specific exclusion of business methods from the purview of the term invention under section 3(k) of the Patents Act, 1970. Therefore, blockchain claims in the field of financial technology may have a hard time inovercoming the business method exclusion. In the *Yahoo*[26] case, which was related tothe business method exception under section 3(k), the IPAB held that once it is established that the claim is nothing more than a business method then there is no needto investigate further as the claim is excluded from patentability. The Board further stated that when the advancement claimed in the subject matter of the invention is itselfan excluded subject matter by virtue of section 3 then the claim is said to be excluded.Thus, a blockchain technology claim which is aimed at some business method may notbe eligible for a patent since the subject matter of the claim is itself an excluded matter.

As per the Guidelines for Examination of CRIs 2017, if the subject matter is in substance about carrying trade, finance, or transaction the same should be treated as a business method and shall not be patentable. The business method threshold in Indiais slightly more than in the UK and definitely much more than in the US. Financial technology companies and Startups might find it difficult to overcome this exclusion unless they could show that their claims are not essentially about the business method but something that is related to the implementation of blockchain technology.

In case of claims with respect to the implementation of blockchain technology in fields different from business methods or claims which are directed towards improving the core technologies in the blockchain, then the claim shall be assessed under the computer program *per se* exclusion. As per the Guidelines for Examination of CRIs 2017, the substance of the invention matters when assessing the exclusions under section 3(k), not the form in which it is claimed. Blockchain claims which areessentially nothing but routine working of a computer program or are directed at database stored in a compute medium then, the claim is said to be directed towards computer program *per se* and would be not patentable. The Guidelines do not mention anything with respect to technical effect or

[26] *Yahoo* v. *Assistant Controller of Patents and Designs* OA/22/2010/PT/CH.

technical advancement shown by acomputer-related invention, which would be blockchain technology in this case. Although the jurisprudence with respect to patent eligibility of computer-related inventions is quite limited in India, the limited cases which have spoken upon it clearlyindicate that if a claim related to a computer program shows a technical effect or showcases technical contribution then the claim cannot be said to be computer program *per se*[27].

A blockchain technology claim can demonstrate technical effect or advancement in the form of a novel interaction between software or hardware, or usageof a novel hardware with blockchain technology. Since blockchain is still a very youngtechnology, there are various technical areas of this technology which require improvement like its scalability, speed of transactions, and storage requirements and therefore any claim which is directed at the improvement in any of these areas might not be regarded as computer program *per se*. Going by the observations of the Delhi High Court in *Ferrid Allani* case where the Court acknowledged the fact that acrossthe globe, the testing parameter for the computer related inventions is a technical effector technical contribution, and therefore if an invention shows any one of them, then it is patentable. In light of these observations, it is highly likely that Patent Offices andeven Courts shall look into blockchain technology claims from the point of the technicalcontribution they provide in the existing technology or solve any existing technical problem in the present technology.

In the case of both AI and Blockchain, the patent landscape is still evolving andsince these technologies are pretty new, the legal jurisprudence with respect to the subject matter patent eligibility is still at a very nascent stage. However, the fact cannotbe denied that both the technologies show a tremendous amount of scope for innovationand improvements, and the Startups and MSMEs particularly in India have the opportunity to grab this patent landscape. Their efforts of patenting their innovation inemerging technologies can be further bolstered by introducing Utility Models Patent regime in India.

9. CONCLUSION

In *Ferid Allani* v. *Union of India*, the Delhi High Court stated that "In today's digital world, when most of the inventions are based on computer programs, it would be retrograde to argue that all such inventions would not be patentable. Innovation in the field of artificial intelligence, blockchain technologies and other digital products would be based on computer programs, however the same would not become non- patentable inventions simply for that reason. It is rare to see a product which is not based on a computer program." This observation rightly captures the future of computer-related inventions, especially in the field of emerging technologies. A very restrictive approach with respect to the inventions which

[27] *Accenture Global Services GMBH* v. *The Assistant Controller of Patents TelefonaktiebolagetLm* OA/22/2009/PT/DEL.

are computer-related would discourage MSMEs and Startups from investing and exploiting the innovation opportunities provided by these technologies.

A very liberal approach on the other hand could increase the race to patent among innovators, which could lead to granting of law quality patents, that would prove counterproductive to the innovation capabilities of local enterprises. The need of the hour is to have a balanced approach towards computer-related inventions which wouldnot only support the MSMEs and Startups, but would also align with the goals of patentlaw, which is encouraging inventions and dissemination of knowledge. The Government initiatives and support aimed at encouraging generation of patents by MSMEs and Startups is indeed a step in the right direction and it must be backed up byclear and coherent patent policies especially related to computer-related inventions as they are going to have an indispensable role in shaping the future of the country. A strong domestic innovation ecosystem could not only provide necessary support to larger industries by providing incremental solutions, but would also encourage them toprovide solutions to local problems with the help of computer related inventions, making sure that these technologies penetrate in the local population.

The digital transformation that the country is aiming towards, needs a strong ecosystemof innovation, particularly at the levels of MSMEs and Startups which are the engines of growth in India. The pace of innovation in computer technologies is fast and is filledwith extensive competition. If India wants to make sure that its MSMEs and Startups produce quality inventions in the field of digital technologies, that are at par with the best in the international, then some serious reconsideration of the present patent system,particularly in the context of computer-related inventions is required. The next chapterconcludes the research and brings to fore some suggestions which could be helpful in dealing with the issues surrounding the patent eligibility of computer-related inventionsparticularly in the context of India.