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**TECHNOLOGICAL CHALLENGES VIS A VIS SECURITIES
MARKET**- Apoorv Mishra¹**Abstract**

This study investigates the difficulties posed for the securities market by technological advancements. While trying to keep up with this evolution, a number of regulatory authorities are hard at work to guarantee that markets are both fair and efficient. When compared to prior periods, tremendous technological advancement has occurred, and this trend of technological advancement is continuing now. Innovative solutions powered by technological advancements are now not only possible but essential for earlier, more preventative identification and response. Due to the ubiquity of the problem, the increasing societal effect it has, and the interdisciplinary character of the field as a whole, it is of the utmost importance that an attempt be made to introduce it. In the last section, this study makes a number of recommendations that might contribute to the improvement of the securities market.

Key words: - Securities, Technology, Market

Significance

The significance of this research is to study the relation between technology and securities market that how technology is presenting challenges for securities market.

Body

The financial markets in the United States are undergoing a dramatic transformation as a result of massive technical advancements, especially the growing use of the Internet. The flow of information is gradually becoming more streamlined and borderless, immediate, and virtually entirely free of charge. Opportunities exist for markets services, for new rivals, and for new

¹ Student at ILS Law College

types of competition as a result of the fast changes that have already occurred and the much more rapid changes that are yet to come. In addition to this, they highlight the necessity for fresh ideas regarding the regulation of the nation's financial markets.²

The stock markets have already been significantly altered as a result of the introduction of new information technologies. Larger and more mid-sized businesses have largely automated their order processing systems. The internet is being used by mutual funds for the purpose of communicating with investors, as well as for offering and distributing shares. The Internet is used by corporate issuers of all sizes to undertake offers of their securities. Investors are increasingly going around conventional exchanges and trading systems based on dealers in favour of electronic networks, which allow them to transact with one another directly at a reduced cost. Customers who trade stocks on their own behalf are increasingly doing it using online platforms rather than by contacting or physically seeing their brokers. Without the assistance of the conventional market middlemen, a number of very little issuers have utilised the internet to create second trading markets for stocks that are often rather difficult to trade. The global securities market is indeed a technology-intensive business, and it has been ideally positioned to take use of the benefits offered by the internet. In fact, it began doing so practically as soon even as internet became widely available. The trade of stocks and other financial instruments used to take place on physical trading floors and exchanges, but these operations are now mostly or entirely performed by computers in their intermediated and decentralised forms. The internet provides “a low-cost and efficient alternative means to reach millions of potential interested parties without incurring the expense of a road show, without hiring the usual cadre of lawyers and financial advisers, without hiring a printing service, and, most importantly, without leaving the house.”³

The expansion and innovation of financial services will have even more opportunities in the coming decade thanks to the continued rise of the Internet and its offshoots, especially as customers become more accustomed to and wired for using digital communications innovations and as confidentiality and security concerns are resolved. The financial industry as a whole will be affected. Regulation must change to keep up with the market's adoption of new technologies.

² Steven M. H. Wallman, *Information Technology & the Securities Market: The Challenge for Regulators*, Brooking (23 June 2022, 14:00 Hrs <https://www.brookings.edu/articles/information-technology-the-securities-market-the-challenge-for-regulators/>)

³ Canada Etrade, <https://www.canada.etrade.com/pages/home/main.shtml> (23 June 2022).

The long-term effects of ongoing technological advancement are significant.⁴

Investment advisors may now provide extra services to their customers more effectively thanks to new technology. Through its interpretative announcements and by giving advisors extra legal advice, the Commission has made it easier for them to utilise modern information and communications technology. The Commission has attempted to interpret its regulations creatively in order to enable such advances that are compatible with investor safety. The Commission is aware of the numerous advantages that technology may offer advisors. Concerning technology and investment advisors, a number of legal questions have come up, such as whether certain behaviours would qualify one as a “investment adviser” under the law. Other legal difficulties include the use of Internet by unregistered investment advisors, the dissemination of adviser marketing via electronic media, the use of digital media to connect with customers, and improved recordkeeping.⁵

Accessing and analysing information. The data playing ground between investors and investment firms will be levelled as businesses give more information on themselves online. Investors will eventually be able to review raw financial information that is now gathered, at significant expense, into quarterly and yearly financial statements, as soon as it becomes available thanks to virtually immediate access to sections of management information systems. The market will be better able to learn from, take in, and act on information thanks to improved telecommunications technology, improved analytics, search new tech, and intelligent agent technology. This will result in more accurate pricing of securities and creative securities trading. Eventually, perceived information risk associated with an investment will decrease, which will have an impact on the cost of capital associated with that investment.

Corporate Management Annual meetings will transition from being “physical” to being conducted electronically. More shareholder votes will be cast thanks to online voting. Annual meetings could be completely phased out in the future. To discuss business matters with other investors, the equivalent of “chat rooms” will be used. Activism by shareholders will gain momentum. Just as they do now with “exit,” selling their shares, investors will be able to utilise “voice,” or corporate governance, to boost shareholder value in real time, when a firm requires reform.

The Indian financial markets will undoubtedly see numerous tech-driven advances in the years

⁴ White House, “Global Information Infrastructure will soon affect almost every aspect of daily life. A Framework for Global Electronic Commerce” <http://www.whitehouse.gov/WH/New/Commerce/index.html> . (23 June, 2022)

⁵ US Securities Exchange Commission, *The Impact of Recent Technological Advances on the Securities Markets* <https://www.sec.gov/news/studies/techrp97.htm> (23 June 2022).

to come, but market players agree that the path will be difficult and risky. While making sure those solutions driven by technology aid investors in making money, scalability is the largest problem. Technology will boost engagement, but we must scale such that platforms do not become unstable as more people use them. The capital market is extremely centralised and is heavily dependent on only two or three types of organisations (exchanges, clearing firms, and depositories).⁶

The Function of Middlemen The technology will sometimes replace intermediaries with new intermediates and new sorts of intermediations, and other times it will replace intermediaries that just supply communications without contributing value in other ways (like via analysis). Offerings will be carried out electronically rather than by a large number of underwriter-employed salesmen. Broker-dealers and traditional exchanges will adapt and offer new services. As companies and sectors embrace cutting-edge technologies like electronic payments, internet banking, and cashless transactions, technology is changing economies.⁷

In addition to the possibilities and advantages that it has brought about for investment businesses, their shareholders, and regulators, technology has also brought about a number of obstacles. The regulatory structure of the securities laws has to be updated so that it can keep up with the ever-increasing speed at which technology advances. The securities market confronts issues in facilitating and responding to changes in technology. These challenges are outlined below.⁸ The necessity for safe methods of exchanging money or private information online, as well as guaranteeing that an investor may redeem share in a fund, are some technological obstacles. Others result from the nature of online itself, which offers exceptional chances for cross-border connection. It will be difficult to make sure that disclosure statements are informative and serve as a roadmap for this group of investors, who have access to relevant data than their grandparents had in a lifetime.

Investors will ultimately get “expert” financial planning advice from software that will eventually outperform many people financial planners in terms of quality. In order to provide ease, speed, and diversity at a low cost, smart agents will assemble a client’s portfolio via the Internet and execute transactions with progressively less investor involvement. The software as

⁶ [Ashish Rukhaiyar, How Tech is Disrupting the Stock Market, Business Today \(23 June 2022, 2:30 PM\) https://www.businesstoday.in/magazine/30th-anniversary-special/story/how-tech-is-disrupting-the-stock-market-321704-2022-02-15.](https://www.businesstoday.in/magazine/30th-anniversary-special/story/how-tech-is-disrupting-the-stock-market-321704-2022-02-15)

⁷ <https://economictimes.indiatimes.com/markets/stocks/news/want-to-be-a-smart-investor-go-for-smart-technologies/articleshow/82242265.cms>

⁸ Michael D. Mann, Cross Border Cyberspace: Jurisdiction in Cyberspace: International Implications of Electronic Markets, *Wallstreetlawyer.com*, June 1997, at 24-26.

well as the tools needed to operate, sell, and advertise it will be developed by new intermediaries, who will also accredit, evaluate, and rank it. Mutual funds or investment advisors will change to provide value in different ways as more investors utilise such technologies. Market structure; clearing and settlement. The current three-day settlement period for securities will soon change to an instantaneous period, eliminating the danger of transaction default. Shares would be stored in book-entry form, much as mutual fund stocks are now, and ownership changes would only be recorded in the computer records of the depository in the digital world that the new technology would create. Investors will be able to pay for goods and be compensated for sells right away thanks to improved money transfer technologies, online money, and electronic currency. The guarantee role of clearinghouses will subsequently be taken over by credit card firms or businesses similar to them by ensuring payment for securities purchases, if still required.

Boutique exchanges, new trading platforms created especially for various investor demands, will become more popular. In the end, an investor will have a variety of domestic and international marketplaces to choose from, each of which will cater to the different priorities of investors, whether they prefer immediate execution, the best price, the least amount of market impact, or a completely different type of trading platform. Finally, technology will keep accelerating the financial markets' internationalisation. Better and more affordable communications and analytics will continue to break down the wall between rivals that was created by time zones and geographic barriers that historically controlled and supported nationalistic attitudes on business. With today's technologies, access to overseas capital markets and international capital users will become easier.

Pressures for Change as well as Pressures Against Change

Regulators face challenging issues as a result of all these advancements. Can technology itself be controlled, presuming it can be, or should regulation be focused on tackling fraud and manipulation? For example, “smart agent” software mimics an investment adviser within the context of the current legal system, and the Internet is beginning to appear a trading market in its current state. In addition, how should markets be classified in a society where several markets no longer easily fit the concept of a “exchange” and are often managed in a variety of ways? What impact will disintermediation have on the government’s capacity to effectively regulate given the loss of hundreds of financial intermediations who served as “eyes and ears” to support legal efforts? How can one regulate to avoid misuse without stifling innovation,

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given that the same information technology advancements that encourage development and capital creation simultaneously open up new opportunities for fraud and manipulation? (The argument for regulations and laws is too compelling and clear to advocate going back to the old caveat emptor system.) Other ways that technology has changed stock trading include direct mail campaigns that can quickly increase stock prices, websites, and online publications like The FT and the WSJ that provide real-time information on takeovers as well as prices so that traders can make better decisions.

It is obvious that as technology develops, the stock market will continue to adopt more complex trading methods. Considering the popularity of automated trading, there will still be a need for the human aspect in the calculations made by the computer, therefore big data may be utilised to study market psychology.⁹ To safeguard the public, regulators have traditionally used a thorough, “command and control” style of regulation. Although that strategy helps in the prevention of misuse, it also inhibits the spreading of innovation as fresh concepts wait for regulatory clearance. Nevertheless, the climate that encourages a command-and-control mentality continues, despite the necessity for a shift in regulatory approach brought on by technology.

For instance, industry, investors, the media, and Congress frequently request that regulators address a particular issue or matter. Regulators adjust requirements just little to account for the major development rather than reconsidering the current ones. As a result, the regulations that were recently enacted must be modified in order to accommodate the next technological advancement. Additionally, the number of remarks made, regulations modified, examinations taken, letters addressed, or lawsuits filed are often rated by Parliament or the media. A continual flurry of activity is often seen as a sign of a busy and thriving organisation. Many modest steps add up to much more than one large one. Additionally, sound-bite accountability favours command and control and gradual regulation. Regulators get criticism much more frequently for failing to safeguard someone who suffers harm than that for failing to support novel or experimental ideas that may have, though no one is certain, contributed to a better society. In order to control behaviour and oversee to what is recognized and safe, regulators choose to create precise, thorough regulations.

Additionally, regulators continue to strive for standards that they can effectively monitor and enforce, as all those who are controlled need precise and thorough instructions. The need for

⁹ How Technology Has Influenced the Stock Market, Computers in City, <https://www.computersinthecity.co.uk/how-technology-has-influenced-the-stock-market/> (23 June 2022).

certainty is what drives precise regulation rather than declarations of basic ideas that enable markets to evolve on their own. This is true for both those who must uphold the law and those who must enforce it.

For market authorities, particularly in the last three years, the quickly evolving technology has presented new obstacles. In this context, SEBI has exercised extraordinary caution in cases like Depth Industries and Integrity Group Entities, where the authorities searched the Facebook profiles of the accused individuals on matrimony websites in attempt to piece together the sequence of events. These technical difficulties, nevertheless, were mostly brought to light in 2017 as a result of the WhatsApp breach case. Here, SEBI collected about 190 devices and looked at the conversations that were retrieved from them after reading news reports about the distribution of UPSI over WhatsApp. After investigation, SEBI discovered that the profits estimates being disseminated corresponded to the actual results that were later declared to stock markets.

“Despite the fact that WhatsApp messages were successfully extracted, SEBI said in press conferences that they battled with the incapacity to conduct a thorough investigation during preliminary investigations because of WhatsApp's end-to-end encryption. Since it's becoming harder to tell so when UPSI loses its secrecy and becomes public knowledge, it's unfortunate that this is not an unusual incident. According to “rule 2(n) of the Insider Trading Regulations”, "UPSI" fundamentally includes any information that is not widely available information, that is, information that is available to the public symmetrically. It may be difficult to tell when information loses its discriminating nature and stops becoming UPSI, however, because of the inventive aspects of technology that enable wide-ranging and quick circulation of information. In light of the fact that these restrictions are only going to get more complicated in the future with the introduction of features like ego messages, timed secret talks, etc., the issue that remains is how SEBI can take proactive measures to maintain a fair playing field.”¹⁰ There are also entrenched interests. Market participants who benefit the most from the present system often oppose changes to it. Their resounding voices strengthen the status quo of regulation.

In a market where the fundamentals are changing quickly, incremental, command-and-control regulation may go horribly wrong despite these obvious incentives for its continuation. The once-steady foundation on which regulators are constructing has become unstable due to changing sands underneath it, and each tiny modification they make is increasing weight to a

¹⁰ **Aastha Agarwalla**, Market Surveillance by SEBI: Catching up to Technology (23 June 2022, 2 PM) <https://lawschoolpolicyreview.com/2020/08/19/market-surveillance-by-sebi-catching-up-to-technology/>

progressively wobbly structure, if regulators don't take a step back and consider these basics. Financial markets have nothing like the rule that innovation is the engine of development. The conventional supply chain of financial products is evolving as a result of new technologies like blockchain and cloud computing, as well as new FinTech players and new content delivery methods. In addition to improving selection and accessibility for investors, this may result in cost savings and increased efficiency for businesses. The epidemic expedited the financial services industry's long-term digital shift, which had already begun. Through user-friendly digital tools, managing personal finances is consistently made simpler and more intuitive. While you enjoy your morning coffee, you can buy stocks or other financial goods with only a few clicks. Key is convenience. The demographics and investing habits of investors are changing as a result of the financial revolution, which also makes capital markets accessible to new segments of society. Younger, more technologically adept individuals were seen to be investing more in equities and other financial products during the epidemic. This was caused by an increase in savings rates, and individuals were also spending an increasing amount of time online during lockdowns.¹¹

A single worldwide regulator for the world's financial markets, according to some, is what's actually required, even if better international cooperation is a move in the right direction. This objective probably won't be accomplished anytime soon. I would also argue that having several worldwide financial services regulators with various viewpoints and regulatory philosophies might be highly beneficial. One benefit is that it lessens the possibility of a single, bureaucratic regulator stifling innovation. Regulatory arbitrage might be advantageous on occasion. However, better international (and domestic) coordination and interaction among regulators is extremely desired, and greater international coordination - specially to avoid additional inequities that hinder international commerce - is certainly needed.¹²

Conclusion and Suggestions

Overall, recent technological developments have increased transparency, opened up previously unheard-of doors for competition and innovation, enabled substantial growth in trading activity, and enabled the creation of risk-reduction strategies. At the very same time, the quick speed of

¹¹Verena Ross, *The major challenges facing securities regulators*, https://www.esma.europa.eu/sites/default/files/library/esma71-99-158_eurofi_speech_-_verena_ross_-_february_2022.pdf (23 June 2022, 2 PM).

¹² Steven M. H. Wallman, *Information Technology & the Securities Market: The Challenge for Regulators*, Brooking (23 June 2022, 14:00 Hrs <https://www.brookings.edu/articles/information-technology-the-securities-market-the-challenge-for-regulators/>)

technologically driven market developments has made it difficult, and will keep making it difficult, to re-evaluate and reform the way it regulates the securities markets around the globe. Because of the speed and magnitude of these technology advancements, businesses—particularly banks—should take immediate action if they want to reap the rewards and keep their competitive edge in the shifting business environment.¹³

Today's fast pace of innovation necessitates a more daring and adaptable approach to regulation. Regulation that is more “goal-oriented,” with regulators expressing broad objectives and letting market players decide how to best accomplish them, must replace command and control regulation. The “Securities and Exchange Commission”, for instance, adopted a goal-oriented strategy in 1995 to decide whether firms might utilise electronic communications to comply with federal securities rules. The SEC decided that the objective should be to promote electronic dissemination of information given the benefits offered by electronic media. The SEC might have used the conventional command and control strategy, which would have prescribed certain forms and a number of requirements that, by themselves, would have met the rule. In this manner, it would be clear to the both authorities and the governed community what would be allowed and which would not. Certainly, it would have made regulatory oversight simpler. However, there wouldn't have been much room for adjustment to accommodate future changes or technological breakthroughs. Investment advisors already use a wide range of innovative technology. Governments have attempted to make it easier for advisors to employ technology to serve better while yet upholding investor protection. Advisors may alter the scope of their services that meet the demands of their customers and make use of the recently made resources when advisors, investors, issuers, and others become aware of the possibilities of these technologies. Future developments in technology could alter the underlying makeup and character of the investment advice sector. Investment advisors may need to come up with new services to draw in and keep advising customers, and to provide those services in accessible and cutting-edge ways as more investors take the initiative to learn about their investments utilising digital communications and computer technology.

As a substitute, the SEC concentrated on two regulatory objectives: how an electronic communication gave investors “notice” of and “access” to information in a manner comparable to conventional paper transmission of information. The two principles and the resulting

¹³ Technology and Innovation in Global Capital Markets, Global Financial Markets Association, <https://www.afme.eu/portals/0/globalassets/downloads/publications/afme-technology-and-innovation-in-global-capital-markets.pdf> (23 June 2022)

legislation were left up to the market players to fulfil. As a consequence, technical advancements may now be employed right away without needing regulatory approval beforehand. The SEC trial has received largely positive feedback. However, such goal-oriented regulation requires a fundamental shift in both how legislators' draught laws and how regulations approach their work. It requires more effort and ingenuity than just drafting commands and regulations. Because enforcing compliance in just such a system requires far more expertise, it requires highly qualified regulators. It requires some confidence as well. We must be prepared to accept that the future will bring both valuable advancements and possible challenges. And we must be prepared to accept that having allowed innovation without regulators dictating how it should look will ultimately benefit U.S. financial markets.

The merits in the working of the smart contracts encoded on the Blockchain vis-a-vis Antitrust issues they carry

Blockchain

A blockchain is basically a shared ledger where transactions are stored and recorded in a verifiable manner.¹⁴ A blockchain is distributed across multiple networks in a computer. Based on the level distribution and openness: public and private. Public or permissionless does not have a central authority and is open to anyone who wants to join it. A private or permissioned blockchain may or may not be open and it depends on the administrator. In case the blockchain is not open to public it can only be joined by nodes that have administrator's permission.

Blockchain and Smart contracts

The contracting space has been enlarged by Blockchain through smart contracts.¹⁵ Smart contracts are computer protocols which are designed to automatically facilitate, verify and enforce agreements among multiple untrustworthy parties. The blockchain platform on which the smart contracts are run is responsible for processing all the transactions. Due to this the necessity of middlemen is ruled out for execution of contracts.¹⁶ In simpler words, in a smart

¹⁴ Reuters, 18th June, 2022, 1:15 A.M., <http://graphics.reuters.com/TECHNOLOGY-BLOCKCHAIN/010070P11GN/index.html>.

¹⁵ Zhiguo He, "Blockchain Disruption and Smart Contracts," 1754-1797, SSRN. file:///C:/Users/Dell/Downloads/190404_cong_he_blockchain_disruption_and_smart_contracts.pdf

¹⁶ Corporate Finance Institute, 18th June, 2022, 4:35 PM. <https://corporatefinanceinstitute.com/resources/knowledge/deals/smart-contracts/> . (HEREINAFTER Corporate Finance Institute)

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contract the contents of buyer-seller are inscribed directly into lines of code. This automates the execution of the contract when the conditions are met. In practice, in legal sense of term smart contracts are not considered a contract. They are basically a potential transaction following if/then rule.¹⁷ The smart contracts enabled converting of paper contracts into digital contracts.

As mentioned above a smart contract because of its pre defined functions stores information, processes input and writes outputs. A transaction is submitted to the blockchain network which invokes the function of the constructor, after the execution of the transactor function the final code of the smart contract is stored on the blockchain.¹⁸ There are different blockchain platforms upon which smart contracts are developed and deployed. These platforms are Bitcoin, NXT, Ethereum, etc.¹⁹ Each of these platforms offer different features for the development of smart contracts.

The active blockchain solutions in smart contracts benefits many industries and businesses. It helps in the health care industry.²⁰ In this industry there have been many instances of patient data breaches. This breach of privacy can be avoided using blockchain. Through smart contracts secure search can be ensure giving access to patient's data to only a few individuals. Smart contracts can even be used in voting system.²¹ This will not only prevent the voting system to be manipulated by the hackers but will also safeguard the votes of the voters. With the implementation of smart contracts a transformation can be brought about in the financial services. Smart contracts enable error checking and hassle free transfer of payment to the user. The smart contracts also help in reducing the paper work and so are considered more efficient.²² The blockchain smart contracts provide secure and access to the digital version to the participants in the chain.

Benefits of Smart Contracts encoded on blockchain

Smart contracts encoded on Blockchain have many applications. This throws light on the fact the smart contracts have several benefits which are responsible for increasing reliance and dependence upon the smart contracts. These benefits are discussed below in detail.

¹⁷ ALTI Forum, 18th June, 8:00 PM <https://alti.amsterdam/smart-contracts-and-antitrust/>. (HEREINAFTER ALTI)

¹⁸ National Library of Medicine, 18th June, 2022, 8:30 PM, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8053233/> (HEREINAFTER NCBI. NLM)

¹⁹ Id.

²⁰ Corporate Finance Institute, *Supra* note 3.

²¹ Id.

²² NCBI.NLM, *Supra* note 5.

Major benefit of the smart contracts is speed, efficiency and accuracy.²³ The traditional contracts involve lot of paper work and take a lot time. Whereas on the other hand the smart contracts save lot of hours of the business processes as the tasks are automated due to the computer protocols. Moreover, traditional contracts many a times were fraught with discrepancies. Smart contracts rule out the possibility of occurrence of manual errors which can occur at the time of filling form.²⁴ In short the digitized and automated system of smart contracts rules out the problems associated with traditional contracts thus, resulting in immediate execution of contracts.²⁵

Smart contracts are also trustworthy and transparent. Because of cryptography all documents remain safe from infiltration.²⁶ There is no involvement of third party in the contract. Moreover, since the transactions are encrypted the possibility of information being altered for personal use is ruled out.²⁷ The encrypted transactions are also difficult to hack. Unlike the traditional contracts it is difficult to change a single entry. In blockchain smart contract each entry is connected to previous entry and hence it is very difficult to change a single entry on the blockchain.²⁸ Smart contracts also result in savings and autonomy.²⁹ Smart contracts enable confirming of a contract without the involvement of a third party. This ensures autonomy of a company or parties entering in the contract as they are not dependent on any third party. This simultaneously helps the parties or companies or organizations to save costs. Smart contracts also prevent loss of original data. Documents and data stored on blockchain gets duplicated multiple times.³⁰ This way the original data can be easily restored in case it gets lost. Moreover, it is automatic thus, loss requires less human efforts.

In today's globalized world where many transactions occur virtually, the trust between parties can be very low.³¹ In such situations smart contracts are very useful. Despite the potential benefits of blockchain, the risks associated with such blockchain contracts cannot be ignored. There are certain limitations of using blockchain which cannot be ignored. The smart contracts

²³ IBM, 18th June, 2022, 8:45 PM, <https://www.ibm.com/in-en/topics/smart-contracts#:~:text=Next%20Steps-.Smart%20contracts%20defined,intermediary's%20involvement%20or%20time%20loss.> (HEREINAFTER IBM).

²⁴ Corporate Finance Institute, *Supra* note 3.

²⁵ Zebpay, 18th June 2022, 9:00 PM, <https://zebpay.com/blog/introduction-and-benefits-of-smart-contract-in-blockchain/>. (HEREINAFTER Zebpay).

²⁶ Corporate Finance Institute, *Supra* note 3.

²⁷ IBM, *Supra* note 9.

²⁸ Id.

²⁹ Corporate Finance Institute, *Supra* note 3.

³⁰ Id.

³¹ IBM, *Supra* note 9.

are immutable.³² Though immutability is a boon and a major benefit of smart contract it can sometimes cause problem as well. It is very time consuming and expensive to change any error in the code. This also makes the smart contracts irreversible. Moreover, erroneous data due to hacking or misuse will be logged on the blockchain in an immutable manner.³³ Many a times it is also observed that smart contracts are unable to handle vague terms.³⁴ Smart contracts also face several challenges like legal, reliance on off-chain resources, scalability and consensus mechanism issues.³⁵ Each country has its own laws and rules and it is very difficult for smart contracts to comply with each and every law. Moreover, it is very difficult to model the laws in smart contracts since they are not quantifiable. Apart from this government's interest in regulating the smart contracts many times results in involving third party thus, eliminating a major part of its essence.³⁶ Even now for receiving information from resources that are not on blockchain the smart contracts are dependent on off-chain resources. Though these oracles are reliable and well tested there can occur a point of failure. Before the widespread adoption of smart contracts it is very important to resolve the issue if off chain resources.³⁷ Another major issue with smart contracts is the scalability of the blockchain contract.³⁸ There are limited number of transactions which can be performed by the smart contract platforms. There is a need to increase number of transactions per second. However, this will be only possible if there is a proper consensus mechanism in place. Consensus mechanism is another major problem in smart contracts.³⁹

Although all these are major issues associated with blockchain smart contracts, the main problem is the antitrust issues they carry.

Antitrust issues associated with blockchain smart contract

Antitrust laws in simple terms are legislations limit the make power of the firm and encourage competition.⁴⁰ These laws prevent multiple firms from colluding or forming a cartel to prevent competition. These laws ensure fair competition among businesses.⁴¹

Smart contracts enable collusion to become stable. The smart contract will execute the terms of

³² NCBI.NLM, *Supra* note 5.

³³ Id.

³⁴ Corporate Finance Institute, *Supra* note 3.

³⁵ NCBI.NLM, *Supra* note 5.

³⁶ Id.

³⁷ Id.

³⁸ Id.

³⁹ Id.

⁴⁰ Investopedia, 18th June, 2022, 9:15 PM, <https://www.investopedia.com/terms/a/antitrust.asp>.

⁴¹ Id.

the cartel. In terms of cartel, smart contracts ensure that staying in cartel remains more beneficial than leaving it.⁴² With the help of smart contracts it becomes very easy for the cartelists to identify who deviated from the cartel. Everyone has access to everyone else's transaction data because of the distributed ledger.⁴³ This way the cartelists can monitor who deviates from the agreed price. Though blockchain smart contracts are very useful in oligopolistic market and for cartel and collusion they might prove harmful as well.⁴⁴

It becomes difficult for antitrust laws to reach tacit forms of collusion in context of smart contracts. It becomes exceedingly difficult for antitrust enforcers to untangle, legal and parallel conduct from anticompetitive collusion.⁴⁵ The collusive nature is cloaked by the automatic built in which the pricing is controlled.⁴⁶ Depending upon who controls blockchain networks, it is possible that certain competitors maybe excluded from the competing market.⁴⁷ That is why, permissioned blockchain smart contracts are very critical in a competitive market. This also prevents the new entrants to compete without these resources. The antitrust issues become particularly acute in markets which are decentralized and are not controlled by government.⁴⁸ In a decentralized market the government may not have an entry point and it becomes really difficult for it to enforce regulations in a competitive market. The degree of these antitrust risks associated with blockchain which are faced by the participants depends on a number of factors. These factors are blockchain membership composition, information sharing protocols, nature of information sharing and efficiencies.⁴⁹ There are several ways to tackle the antitrust issue associated with blockchain smart contracts.

Potential Ways to Mitigate Antitrust concerns⁵⁰

In today's globalized world, regulators and firms are considering ways to off set antitrust risk associated with blockchain adoption. There are many strategies being employed to alleviate the

⁴² ALTI, *Supra* note at 4.

⁴³ Almudena Arcelus, Mihran Yenikomshian, Noemi Nocera, "Mitigating Antitrust Concerns When Competitors Share Data Using Blockchain Technology," 1-7, *Harv. J.L. & Tech. Dig.* 34, https://jolt.law.harvard.edu/assets/digestImages/JOLT_Mitigating-Antitrust-Concerns.pdf. (HEREINAFTER Mitigating Antitrust concerns).

⁴⁴ Constantine, 18th June, 2022, 9:30 PM, <https://constantinecannon.com/antitrust-group/antitrust-enforcement-needs-an-upgrade-to-combat-digital-tacit-collusion-by-blockchain-smart-contracts/>. (HEREINAFTER Constantine)

⁴⁵ Id.

⁴⁶ Id.

⁴⁷ Mitigating Antitrust concerns, *Supra* note 30.

⁴⁸ Id.

⁴⁹ Ryan C. Thomas and Peter Julian, "BLOCKCHAIN TECHNOLOGY: A FUTURE ANTITRUST TARGET?" 18-35, *The Journal of the Antitrust, UCL and Privacy Section of the California Lawyers Association*, 30(2), <file:///C:/Users/Dell/Downloads/COMPETITION%20%20BLOCKCHAIN%20TECHNOLOGY%20%20FINAL%20PROOF.pdf>.

⁵⁰ Mitigating Antitrust concerns, *Supra* note 30.

antitrust issues arising from adoption of technology. First is centralized governance.⁵¹ Regulators can be given by centralized block administrators for their own special access networks to carry enforcement measures.⁵² Guidance on clear membership rules for accessing network can be provided by regulators. Administrators of centralized network can iteratively encode measure to combat antitrust behaviour before and after it occurs.⁵³

In order to help regulators investigate the claims of antitrust violations transparency should be implemented in the network system. Networks should be improved to provide reliable, accurate and comprehensive data to investigators rather than piecemeal and inconsistent data.⁵⁴ Moreover, for faster resolution of antitrust investigations there is a need for standardized format of data in blockchain.⁵⁵

Apart from these solutions there is a need for antitrust enforcers to become versed in blockchain technology.⁵⁶ Antitrust agencies should enforce technology buffs for the same. This is because for analyzing the collusive agreements on blockchain the enforcers need experts of this field. It is also necessary that the antitrust enforcers stay abreast of technological innovations in blockchain.⁵⁷ The best tool for detecting and combating collusion through smart contracts is whistle blowing.⁵⁸

Smart contracts are very much needed in a globalized. With the increasing opportunities for rising of collusion, firms are bound to take advantage of this situation when the investigators are behind the curve. The need of the hour is to strengthen antitrust regulations and make it ready to tackle such situations.

Conclusion and Suggestions

Metaverse: Understanding the Concept

Neal Stephenson established Metaverse in 1992 utilising blockchain technology and digital assets known as “smart contracts.” These smart contracts are recorded on the blockchain and are used in other virtual and real worlds.⁵⁹ Metaverse is also a decentralised platform, meaning

⁵¹ Id.

⁵² Id.

⁵³ Id.

⁵⁴ Id.

⁵⁵ Id.

⁵⁶ Constantine, *Supra* note 31.

⁵⁷ Id.

⁵⁸ Id.

⁵⁹ Cory Ondrejka, *Escaping the Gilded Cage: User Created Content and Building the Metaverse*, 49 N. Y. L. SCH.

the virtual world is not governed by a central authority. Metaverse allows users to build their own digital goods and experiences.

There are several ways to characterise the ‘metaverse’: a post-reality world that enables multiple users to interact in a shared virtual environment, a 3-D extension of the internet itself, or even as the next frontier of the digital economy.⁶⁰ Eventually, the metaverse may resemble its first use, as depicted in Neal Stephenson’s 1992 science fiction book *Snow Crash*, as a huge digital world where users might interact. While the Metaverse may evade a widely agreed definition (at least for some time), current trends indicate that it will continue to grab popular culture, imagination, and an expanding number of facets of existence.⁶¹ As early as 2005, the metaverse was regarded to be more than just a collection of massively multiplayer online role-playing games (MMORPGs) (or massively multiplayer online role-playing games). In several B2B, B2C, and C2C applications, augmented reality, virtual reality, and components of the “metaverse” are already prevalent on the Indian market today. Indian IT companies and start-ups have responded swiftly.

Legal concerns and key concepts

Undoubtedly, the establishment of an alternate virtual environment that simulates a broad variety of interactions between individuals in the real world will create a number of critical legal issues that certain countries may not be prepared to face.⁶² Intellectual property remains a top problem for the developers and producers of the metaverse; in a system where various users and creators interact to alter the environment and generate new material, it may be difficult to demonstrate authorship and ownership of individual items. If the avatars are designed to be pseudonymous, enforcement may be difficult, particularly without the assistance of the administrator of the metaverse or if the infringement is located outside of a specific country. Intellectual property issues pertaining to the metaverse have already been brought before the courts: well-documented instances of digital replicas of Swiss watches, including Cartier, and Hermès shopping bags on platforms such as Second Life have been the subject of intellectual property infringement lawsuits. However, such issues have not yet been litigated in the Indian context.

L. REV. 81 (2004).

⁶⁰ *Id.*

⁶¹ Lastowka, F. Gregory & Dan Hunter, *The Laws of the Virtual Worlds*, CALIFORNIA LAW REVIEW 1-73 (2004)

⁶² Pranav Nayyar & Vivek Kumar, *Expanding the Meta: Exploring The Legal Ramifications of the Metaverse*, RGNUL STUDENT RESEARCH REVIEW (Dec 6, 2021) <https://rsrr.in/2021/12/06/legal-ramifications-of-the-metaverse/>

Since practically all actions in the metaverse will take place in spaces owned and managed by distinct entities (including decentralised organisations), data privacy and protection become especially crucial for users. As the value of digital products and services increases, ownership will become crucial, just as it is with physical items. In situations involving virtual real estate, high-value products, or non-fungible tokens, it is crucial to demonstrate ownership and have enforceable rights against such assets. Smart contracts and decentralised ledgers serving as proof of ownership might relieve some of these problems by enabling an on-chain authentication procedure and grievance resolution mechanism. The proposed Indian legislation on data protection, including personal data, is awaited; it will cover the rights of the natural person to whom the personal data relates (as per the definition of "Data Principal" in the Data Protection Bill, 2021); however, it is unclear to what extent such rights and protections may extend to digital avatars.

Unique legal and design issues develop in the context of B2C and C2C metaverse applications: when a number of metaverses exist, each with its own regulated environments, rules, and ownership, the degree of independence and interdependence becomes an essential factor to address. In legal terms, this may need the voluntary harmonisation of standards toward interoperability of settings in order to guarantee that digital avatars, commodities, services, and payment mechanisms are mostly interoperable and functionally equivalent. It needs to be seen if this is accomplished nearly completely voluntarily or via self-regulatory organisations.

Here are four crucial phrases you may see in the metaverse that might affect your legal rights and options:

- **Intellectual property (IP)** — A licence for IP must be tied to certain technological platforms, services, and content bundles inside the metaverse. The licence will define terms, territories, and royalty rates, as well as the license's scope. To allow interoperability without compromising the creator's rights, IP contracts must be properly structured.
- **Copyright** - For the metaverse, new copyright laws will need to be developed. Currently, U.S. copyright law does not explicitly require human authorship; yet, the majority of courts recognise that authorship implies human origin. In the meanwhile, AI content makers may become prevalent in the metaverse, resulting in a substantial grey area. This must be handled by futuristic legislation.

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• **Patents** - Unlike copyright, it is explicitly stated that only human beings may be inventors and patent holders. However, the metaverse is a broad and technologically complicated platform that will rely on several patents from a variety of firms and developers. The royalties system must consequently be modified.

• **Trademarks** - The metaverse offers many opportunities for registered trademarks of a business to emerge in unexpected places.⁶³ For instance, a McDonald's may be visible in the window view of workplace collaboration software. Companies such as Nike are already addressing this problem by registering trademarks for any essentially downloadable items.⁶⁴

Needed: rules establishing constraints on the expansion of Metaverse technology

Concerns abound about the legal ramifications of the Metaverse's technology. From the problem of groping a female avatar to the sale of millions of dollars' worth of goods, the Metaverse has presented a variety of obstacles. Nonetheless, this is simply the beginning of the Internet revolution, and it will be 10 to 15 years before the full consequences of Metaverse technology become apparent.⁶⁵ However, legislators will need to be proactive to ensure that the Metaverse's technology is compliant with data protection standards. This necessitates an early draught of the law governing the Metaverse, so that when technology progresses, it does so within the confines of the law.

Possibilities and facets of regulatory administration

I am not necessarily persuaded that regulation is necessary or even viable for every metaverse. There are already around 160 firms functioning in the metaverse, with many more expected. Theoretically, any of these independent operators may operate forever without a regulating structure. In the absence of global governance of the metaverse, there may be nothing to prevent an offshore investment vehicle from operating its own piece of the metaverse and users from other virtual worlds from gaining access to it.

It is more probable that certain virtual worlds will be controlled, maybe subject to major regulations on privacy or the transferability of assets, while others will not. In the latter, the

⁶³ Aparajita Lath, *Trademarks and the Metaverse: Imaginary Rights or Real Wrongs?* SPICYIP (May 18, 2022), <https://spicyip.com/2022/05/trademarks-and-the-metaverse-imaginary-rights-or-real-wrongs.html>

⁶⁴ *Id.*

⁶⁵ Siddharth Chaturvedi & Priyansh Bharadwaj, *Why India should start framing a law for the Metaverse*, LEAFLET (Feb 10, 2022), <https://theleaflet.in/why-india-should-start-framing-a-law-for-the-metaverse/>

probabilities of both fraud and profit are comparable.

Some of the metaverse's underlying technologies, such as immutable blockchain and distributed ledger technology may minimise transaction risks and the need for financial regulation. Not only does blockchain make it difficult to modify transaction data without documenting the changes, it also makes a public record of the data available to all parties involved.

However, the metaverse's whole ethos seems to be at conflict with this kind of traceability. If you may be whatever you choose in a virtual environment, you may not be required to establish your identity, which is not always consistent with regulations. Anonymity is one of the most alluring aspects of the metaverse, not necessarily as a cover for evil actors but as a method of preserving privacy. 55% of U.S. internet users are worried about the monitoring and exploitation of personal data in the metaverse.

Real financial services in virtual worlds

For any financial regulation to be successful in the metaverse, there must be strong ties between virtual and real-world personalities, as well as adherence to many of the same criteria that ensure the safety of the real-world financial system. Know your customer (KYC) standards, tax rules, risk management approaches, etc. will all have a role in virtual reality as it develops.

More control will be necessary as the metaverse becomes more tangible. Eventually, asset classes that form in the metaverse may attract value in the same manner that they do in the physical world, necessitating the same types of oversight and governance structures. Because there will be more to lose, there will also be more to defend.

Stages to an ethical metacode

Regulations take years to evolve, therefore as responsible enterprises in the metaverse, whether we are owners, investors, or advertising, we must adopt and adhere to a basic set of principles.

Within the confines of social acceptability and without endangering users, driving change from the inside might provide the metaverse and its members the flexibility to offer enjoyable, creative, and risk-free user experiences. This would attract marketers and investors from a strictly economic standpoint by offering a clear risk framework with great ESG alignment and minimal reputational risk.

Developing these concepts will need collaboration and most likely trial and error, but may include the following:

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Set standards

The most respected players in the metaverse may create an autonomous industry group and develop their own stringent norms of behaviour by banding together.

Overseen by a 'Metarules Compliance Officer', the metaverse will have the following four requirements: i) KYC requirements that make metaverse users verify their real-world identity, including a robust process for registering minors to minimise abusive actors; ii) safe spaces for mental wellbeing and AI tools to monitor addiction and PTSD; iii) the ability to opt into – and frequently confirm – levels of content; and iv) maintaining a cross-industry.

Promote optimal financial practises

There should be well-defined procedures for managing the metaverse's financial risks. For instance, exchange costs should be disclosed when independent stablecoins are moved into or out of metawallets, and real-world collateral should be provided for large loans or transactions. It would also make sense to outsource the verification of identification documents to a trustworthy third party and to offer insurance against personal loss or even third-party harm.

Key to enabling these processes in the metaverse, as well as providing functionality for embedded finance, securitization, wealth production, and taxes, will be the technology that underlie the actual financial world. In order to provide these features, regulated environments will need the proper plug-ins, APIs, and user experience processes.

Provide customers with distinct options

The industry organisation might create a quality seal that identifies virtual worlds that self-regulate, conform to the established criteria, and are thus safe to visit.

Then it would be up to users of the metaverse to decide whether to stay to sanctioned zones or take their chances in situations that are plainly uncontrolled. Virtual worlds devoid of real-world business presence would also make it difficult to implement regulatory norms. Individuals, parents, and guardians must understand which protections exist and what may occur if they are missing. I might also see the emergence (either in the metaverse or in the actual world) of specialised welfare services to assist with the human implications of weak regulation.

As with external controls, the key to effective self-regulation will be to enhance openness, credibility, and accountability via systems that adhere to industry best practises. Crisis will almost surely arise, and we will all learn from them. The collaborative responses of governments, corporations, and consumers will define the future metaverse as a place that

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complements and enhances our actual lives.

What Issues Does the Law Need to Address?

As the metaverse is being constructed, the phrases IP, copyright, patents, and trademarks pertain to ownership law; but, what about real interactions after the platform is in place?

Future legislation will need to address topics such as:

Uncertainty over the intent of NFTs

Multiple commenters have observed that NFTs are not necessarily a perfect reproduction of actual deals. In essence, they are a description of the item or service included inside the asset.

This limits ownership to a certain level; for example, an NFT buyer cannot change digital artwork, but an art collector may do anything they want with paintings.

Therefore, it must be determined if NFTs are intended for investment, in-game use, or something else.

The danger of biased competitiveness by larger competitors

In principle, the metaverse is decentralised, yet it is feasible that a small number of operators would control vast swaths of it.

Depending on your location, today's social media platforms are often controlled by a well-defined group of content makers. To combat this danger and provide a fair playing field for businesses of all sizes, antitrust legislation must change.

Creating responsibility for data processing

Rapid and high-volume data processing will be required to support scalable worlds and intuitive experiences in the metaverse. But the origin of data must be established, with agreement, and the whole value chain must be held accountable.

Companies in the metaverse must be required by law to conceal their training and testing data so as not to violate the privacy rights of individuals.⁶⁶

Sexual harassment, cyber bullying, and discrimination are unacceptable.

This is a significant field of law that is essential for policymakers and law enforcement in the virtual world. Cyber bullying has been an issue with social media for a long time, and 75% of victims of online harassment have met bullies on Facebook.⁶⁷

⁶⁶ K. Bavana, *Privacy in the Metaverse*, 2 JUS CORPUS L.J. 1 (2022).

⁶⁷ Dr Pin Lean Lau, *The metaverse: three legal issues we need to address*, BRUNEL UNIVERSITY LONDON BLOG (Feb 2, 2022), <https://www.brunel.ac.uk/news-and-events/news/articles/The-metaverse-three-legal-issues-we-need-to-address>

The metaverse might make it more difficult to police these types of actions, necessitating stringent and preventative policymaking. Another topic requiring attention is discrimination, so that businesses, people, and AI organisations apply the same set of rules to all user groups.

The legal community is, thankfully, highly aware of what the metaverse involves. On the metaverse, consultancy firms such as Reed Smith and PwC may give legal/compliance assistance to businesses.⁶⁸

Suggestions & Strategies for Metaverse

Metaverse prospects are fresh and will change as technology advances. Metaverse creators should consider these.

Be willing to try alternative metaverse platforms and techniques

New and growing metaverse technologies. Companies constructing metaverse platforms use varied techniques, including adding capabilities over time. A corporation should be prepared for the failure of present and future metaverse platforms. Companies should experiment with several metaverse platforms and tactics, changing as required.

Consumer experience

A metaverse plan should include customer experience and hardware or technology costs to access the platform. The high cost of VR headsets may restrict consumer adoption of metaverse systems needing them.⁶⁹ The metaverse plan should be integrated with other elements of the company's digital strategy, such as NFTs, social media, and communication channels (eg, Discord or Telegram), as well as real-world events.

Ensure the firm has IP rights for its current material

Companies may want to leverage current material to accomplish their metaverse strategy, but they must have the required permissions to use third-party content. Music in TV ads is usually licenced for a single spot. Indeed, NFT market conflicts have emerged about exploiting existing material. Miramax Pictures sued Quentin Tarantino for Pulp Fiction draughts and other materials.

If third parties possess the content rights, a firm building a virtual experience on a metaverse

⁶⁸ *Id.*

⁶⁹ Tom K. Ara et al., Exploring the metaverse: What laws will apply?, DLA PIPER (Feb 22, 2022), <https://www.dlapiper.com/en/us/insights/publications/2022/02/exploring-the-metaverse/>

platform should guarantee its licence from the intellectual property owner or licensor is comprehensive enough to cover the production and licencing of the material. Even though the corporation controls the content's intellectual property, it may have licenced metaverse IP to other parties.

National Geographic's writers sued for years over the magazine's right to publish a CD-ROM compilation. Images, movies, and music might have complicated rights that need specific knowledge to examine and secure. Videos may incorporate copyright-protected moving pictures, still photos, music, and backdrop scene aspects (such as street art), all of which may need to be approved for the particular purpose.

Future Proof strategy

Companies should guarantee that future licencing to third-party material include rights to utilise it for virtual experiences on metaverse platforms. The firm may learn from the entertainment industry's transition from films to TV to videocassette to DVD to streaming. Companies should also register their trademarks in the new metaverse categories.⁷⁰

Monitor metaverse platforms for IP infringement

Many people in the metaverse are nonchalant about IP rights (and some participants are willing to misappropriate the rights of other parties to make a quick dollar). Mason Rothschild produced NFT copies of Hermes' Birken bags called "MetaBirkens." Hermes sent him a C&D. Some platforms still provide MetaBirken NFTs as of this writing. Metaverse creates additional potential for IP misappropriation, thus content owners and licensors should monitor and enforce their rights.

Concluding Remarks

Humans are just approaching the metaverse's event horizon. As we learn more about the metaverse, organizations and people will integrate it into their real-world lives.⁷¹ As the metaverse develops and grows, legal counsel must assist clients overcome legal and regulatory challenges. If the metaverse becomes the ultimate confluence of technology, content, and

⁷⁰ Chritina Nordin, *What regulation is on the horizon for the metaverse?*, OSBORNE CLARKE (April 26, 2022), <https://www.osborneclarke.com/insights/what-regulation-horizon-metaverse>

⁷¹ Kostenko, Oleksii, *Metaverse: Legal Prospects of Regulation Application of Avatars and Artificial Intelligence*, RESEARCH GATE (2022).

human experience, predicting and resolving its legal and regulatory concerns will be crucial to its effective acceptance by humanity.



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