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EMBRACING TECHNOLOGY FOR EFFICIENT ADR: EVOLUTION, RECENT TRENDS, CHALLENGES AND OPPORTUNITIES

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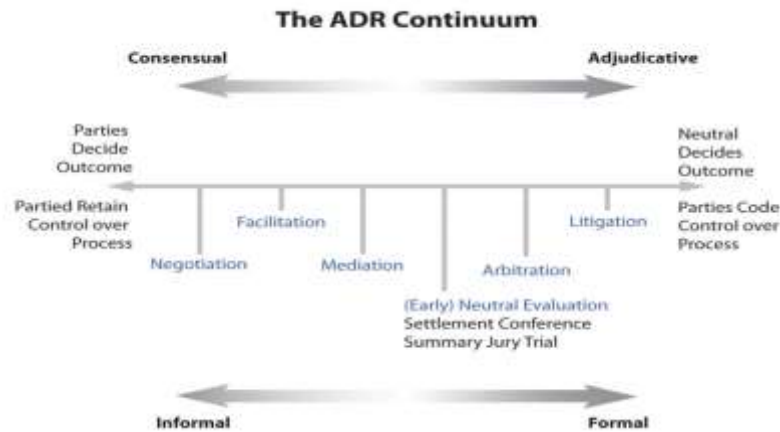*2nd Year LLB Student, Govt. Law College, Kozhikode*

ABSTRACT

Technological revolutions pose a real challenge to almost all professions. They demand adapting to a new and unconventional way of working. The digital revolutions in contracting and Alternative Dispute Resolutions started by late 1990s when the rise of internet and ecommerce transactions paved foundations for E-contracts. In the current era of very dynamic and rapid technological advancements, the traditional mechanisms of dispute resolutions are also undergoing significant transformations. Our society's natural response to COVID-19 pandemic has enabled or rather forced us to deal with several online tools. Online Dispute Resolution of various forms is a quantum leap in this arena. Online platforms leverage digital tools for real-time communications and break geographical barriers. Web or cloud-based document management systems facilitate secure and organized storage and sharing of documents among parties, arbitrators, and mediators. The application of Virtual Reality and Augmented Reality technologies are emerging trends. Another technological development in this domain is smart contracts enabled by block chain technology. Smart contracts help to automate recurring but standard transactions and have capabilities to enforce the terms of agreements without the need for intermediaries. Blockchain technology is used for resolving disputes associated with smart contracts. Crowd arbitration is a new blockchain based concept which is still in its nascent stages. Of late, the emerging Machine Learning and Artificial Intelligence technologies are revolutionizing world by enabling predictive analysis, decision support, and automated research. In e-commerce platforms, inbuilt chatbots and virtual assistants are facilitating preliminary negotiations and mediation, thus by helping the first layer of dispute resolution process.

INTRODUCTION

Alternative Dispute Resolution (ADR) is the process of applying alternate mechanisms and resolving the disputes outside the formal judicial system. It involves methods like negotiation, conciliation, mediation, and arbitration and aims to facilitate mutually agreeable solutions between parties. In general, ADR methods are diverse and have got a wide range of approaches. The disputed parties to choose the most appropriate approach for their specific needs and circumstances for achieving efficient and effective resolution of their disputes. There comes the need for understanding the concept of continuum of various ADR methods. ADR Continuum explains varying degrees of formality and involvement of third-party neutral along with extend of their involvement in the ADR process. If a linear continuum model is assumed, at the left end of the continuum are informal and collaborative approaches like negotiation and conciliation. In negotiation and conciliation, parties work together to find mutually beneficial solutions. Conciliation may involve presence of facilitators. At the middle of the continuum, mediation introduces a trusted but neutral third party to enable dialogue and help the parties to resolve the disputes. In mediation also, the neutral does not pronounce the decisions, but help the parties to arrive to a decision which is acceptable to both the parties. Further towards the right of the continuum, arbitration provides a more formal process where an arbitrator, normally an expert or a panel of experts in the field of disputes, makes binding decisions based on evidence and arguments presented by the parties.

The ADR Continuum

Consensual   Adjudicative

Parties Decide Outcome   Neutral Decides Outcome

Partied Retain Control over Process   Facilitation   Litigation   Parties Code Control over Process

Negotiation   Mediation   Arbitration

(Early) Neutral Evaluation
Settlement Conference
Summary Jury Trial

Informal   Formal

Figure 1: ADR Continuum[1]

ADR plays a critical role in the modern legislative environment for several reasons. It reduces the dispute resolution time drastically. Further it provides a more cost-effective and efficient means of resolving disputes. Also adopting ADR by disputed parties reduces the burden on courts and legal systems, which could have been used for the other societal purposes. Additionally, ADR processes are often less adversarial and thus by promoting more amicable resolutions. This helps preserving relationships between disputing parties. ADR also offers greater flexibility in scheduling and venue, accommodating the needs and preferences of the parties involved.

Like any other normal workflow process, modern ADR has also evolved over a period of time, but starting from ancient ages. The institutionalised ADR and legal frameworks have got their ground during the past century. Currently, like all other businesses, ADR field is also undergoing a technological revolution. There are pros and cons. However, popularity and the flexibility of the digital technologies to address its limitations are making every stakeholder involved in the value chain of ADR process learn and get accustomed to these technological advancements. In reality, technological advancements have further enhanced the efficacy of ADR. For example, Online Dispute Resolution (ODR) platforms allow parties to resolve conflicts remotely, making the process more accessible and convenient. AI-assisted mediation uses algorithms to help mediators analyse data and suggest solutions, while blockchain technology ensures transparency and security in arbitration processes. These innovations have

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[1] Saylor Academy, Alternative Dispute Resolution, in The Legal and Ethical Environment of Business, https://saylordotorg.github.io/text_the-legal-and-ethical-environment-of-business/s07-alternative-dispute-resolution.html (last visited Feb. 13, 2025).

made ADR faster, more reliable, and better suited to the demands of today's technology driven industry. This paper dwells in to all these relevant areas.

EVOLUTION OF MODERN ADR

Modern forms of ADR have evolved mainly over the past century. ADR practices can be traced back to ancient civilizations. The use of mediation and arbitration in one form or another were recorded in the histories of ancient Greece, Rome, and India[2]. These early forms of ADR were community-based and focused on reconciliation and maintaining social harmony[3]. The modern ADR movement began in the early 20th century. Started in the United States, with the establishment of organizations like the American Arbitration Association (AAA) in 1926. This period saw the formalization of arbitration and mediation processes. After World War II, ADR gained international prominence as a means to resolve commercial and international disputes. The United Nations Commission on International Trade Law (UNCITRAL) developed the Model Law on International Commercial Arbitration in 1985[4], which has been adopted by 93 states in 126 jurisdictions[5]. The late 20th and early 21st centuries have seen a global expansion of ADR, with many countries adopting ADR mechanisms to reduce court backlogs and to provide more efficient dispute resolutions. Institutions like the International Chamber of Commerce (ICC)[6] and the International Centre for Dispute Resolution (ICDR)[7] have played pivotal roles in promoting ADR globally.

India also has a rich tradition of resolving disputes through non-adversarial means. Before the formalization of the legal system under British rule, informal justice systems based on community leadership played a central role in dispute resolution. Ancient Indian societies relied on village councils or "panchayats" to resolve disputes between villagers. These panchayats, comprising village elders, acted as informal mediators or neutrals, providing resolutions based on local customs, ethics, and fairness. During the British colonial period, the

[2] Igor Rašljanin et al., Short Historical Analysis of the Development of Arbitration Law, 3 SCIENCE Int'l J. 63, 67 (2024), https://doi.org/10.35120/sciencej0301063r.

[3] Romesh Weeramantry, From Giants to Gunboats: the Evolution of State-State Arbitration, in International Arbitration and the Rule of Law: Essays in Honour of Fali Nariman (Permanent Court of Arbitration, 2021), available at https://cil.nus.edu.sg/wp-content/uploads/2022/04/Romesh-Weeramantry-History-of-State-State-Arbitration-chapter.pdf.

[4] The United Nations Commission on International Trade Law (UNCITRAL) Model Law on International Commercial Arbitration, 1985.

[5] UNCITRAL Model Law on International Commercial Arbitration: Status, United Nations Commission on International Trade Law, available at
https://uncitral.un.org/en/texts/arbitration/modellaw/commercial_arbitration/status.

[6] International Chamber of Commerce, available at https://iccwbo.org.

[7] International Centre for Dispute Resolution, available at https://icdr.org.

formal legal system began to overshadow these traditional methods. However, post-independence, India saw a resurgence in the use of ADR mechanisms. In fact, Part IV, Article 51 (d)[8] of Indian constitution calls for settlement of international disputes by arbitration. The Arbitration and Conciliation Act of 1996[9], modelled after the UNCITRAL Model Law, marked a significant milestone in the development of ADR in India. This Act provided a comprehensive legal framework for arbitration and conciliation, promoting their use in both domestic and international disputes.

The recent technological advancements have greatly influenced the field of ADR, enhancing efficiency and accessibility. ODR is the recent trend in the field. In a way, the COVID-19 pandemic accelerated the adoption of various ODR tools[10]. Though ODR started with online meetings through Zoom or Google Meet, now, Artificial Intelligence (AI), Virtual Reality (VR), Blockchain, and Smart Contracts etc are also considered as part of the broader category of ODR tools. Video Conferencing, e-Filing Systems, Online Case Management Systems, Electronic Signatures, Online Payment Systems, and various Mobile Applications are also subsets of ODR tools which aid the dispute resolution process.
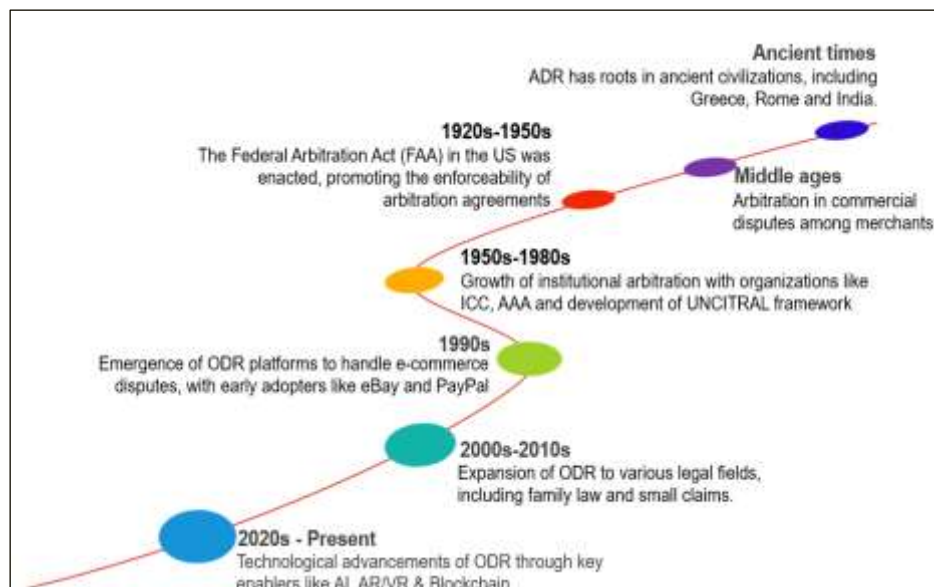

Figure 2: Evolution of Modern ADR

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[8] India Const. art. 51(d).
[9] Arbitration and Conciliation Act, No. 26 of 1996, India Code (1996).
[10] Lola Akin Ojelabi, John Zeleznikow, Louis De Koker & Fahimeh Abedi, Dispute Resolution Practitioners, Online Technologies and COVID-19: Findings from Empirical Research on Use of Technology, 49 MONASH U. L. REV. 225 (2023).

OVERVIEW OF TECHNOLOGICAL ADVANCEMENTS IN MODERN ADR

The technological developments in ADR can be broadly divided into two distinct stages; namely the pre- and post-COVID eras. Before the pandemic, ODR platforms were optional and hence digital tools and applications were gradually and slowly being integrated into ADR processes. However, the onset of the COVID-19 pandemic accelerated the development as well as deployment of these technologies and further adoption to the ADR process.

Majority of the disputes are arising out of contracts. Digitization of contracts, followed by the development of e-commerce industry paved the way for technological advancements in the ADR field. Development of Electronic Data Interchange (EDI) in 1970s which allowed businesses to exchange documents like purchase orders and invoices electronically is considered as the beginning of e-commerce. The next in the pipeline was steps towards online shopping, which happened in 1980s[11]. The real digital transformation in e-commerce industry began in the 1990s with the beginning of the World Wide Web. Companies like Amazon and eBay revolutionised the way goods and services were bought and sold. Alongside this evolution, within no time e-contracts became essential, allowing parties to form legally binding agreements over the internet, thus laying the foundation for a digital marketplace.

As e-commerce industry grew, so did the contractual disputes. Essentially, need for efficient dispute resolution mechanisms became inevitable. ODR platforms began to emerge in the late 1990s, providing a digital venue for resolving conflicts. Some of the e-commerce portals also had provisions of dispute resolutions as part of their customer support functions. These platforms were quite user-friendly as they leveraged technology to offer mediation, and negotiation services online. As the software industry grew, the early 2000s saw significant improvements in ODR tools, including enhanced user interfaces and the incorporation of algorithms to assist in dispute resolution. By the time COVID-19 hit, ODR had almost become an established field, offering a viable alternative to traditional face-to-face dispute resolution methods, which were particularly beneficial during the pandemic when in-person meetings were restricted.

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[11] Km Prachi & Vivek Kumar Nigam, Evolution of E-commerce Industry; A Brief History of Evolution of E-commerce, 49 MONASH U. L. REV. 225 (2023), https://www.jetir.org/papers/JETIR2304588.pdf.

During and after the COVID-19 pandemic, there was a quantum leap in technological advancements that profoundly impacted ODR[12]. Although the basics of these technologies were already present before COVID-19, their full-fledged development and adoption in ODR occurred either during or after the pandemic. For instance, blockchain technology had been around since 2008. With the advent of Bitcoin, block chain technology saw a surge in adoption for ADR purposes during the pandemic. This is because they could ensure unparalleled security and transparency by creating immutable records of all transactions and proceedings. Introduced in 1994 by Nick Szabo[13], Smart contracts also use blockchain technology. Smart contracts were made widely accessible with Ethereum in 2015. They revolutionized the way agreements are managed and enforced by automatically executing contractual terms when predefined conditions are met. Another domain is Virtual Reality and Augmented Reality, which had been evolving since the 1960s. These technologies introduced new dimensions to ADR during the pandemic and can allow parties to create immersive environments, making remote proceedings feel more personal and engaging. Machine Learning and Artificial Intelligence is the latest in the technological advancements. It had been advancing since the mid-20th century and is substantially transforming ADR field. They provide advanced analytical tools and insights, with dynamic algorithms, analysing vast amounts of data to identify patterns and trends, assisting mediators and arbitrators in making informed decisions.

KEY TECHNOLOGIES AND THEIR APPLICATIONS IN ADR

Online Dispute Resolution (ODR)

ODR is the common term used for denoting technology applied ADR. In a general perspective, the word "online" means devices connected to telecommunication or internet network[14]. Since all the recent technology applied ADR process are invariably connected to a computer or internet network, in this article the term ODR is used as a general term for any ADR process in which latest technologies are utilised. Or in other words, ODR is a subset of ADR and all other technology applied dispute resolutions are subset of ODR. However, the extend of utilisation

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[12] Sharad Dave & Siddharth Misra, An Analysis of Online Dispute Resolution in India with Special Emphasis on the Impact of Covid-19: Opportunities and Obstacles, 3.3 J. Contemp. Legal Issues 507 (2023)

[13] James J. Heckman & Sidharth Moktan, The Supply Side of the Race Between Demand and Supply: Ph.D. Education and the Academic Labor Market, NBER Working Paper No. 25443 (2019), available at https://www.nber.org/system/files/working_papers/w25443/w25443.pdf.

[14] Cemre Kadioglu Kumtepe, Bricks and Clicks: Online Dispute Resolution Mechanisms and Implementation of Online Arbitration in Turkey for Cross-Border Business to Consumer E-Commerce Disputes, ASBU Digital Law Review (BHD) 1, no. 1 (2019), https://ssrn.com/abstract=4083115.

of a specific technology in ODR may vary depending upon the industry, type of dispute and objectives of the parties involved in the dispute. ODR is not a specific technology, but a platform generated by combining various existing technologies to provide a better user interface for dispute resolutions. For instance, an ODR digital platform can be developed so that the clients can remotely file documents and evidences, which has got the capability to arrange virtual hearings, manage the case documents and schedules electronically, and can use artificial intelligence to analyse data to provide insights. Even though the user interface could be a mobile or web application, such an ODR platform integrates multiple technologies together to facilitate an efficient dispute resolution. A typical ODR platform is expected to have, but no limited to, provisions for video conferencing and virtual reality capabilities, e-filing, case management and online payment systems, collaborative tools for parties to communicate in the real time, and mobile applications to ensure global connectivity while parties are travelling etc. Real world examples are; Modria - an ODR platform for small claims and consumer disputes[15], CyberSettle - ODR platform for automated case management[16], LegalMation – AI driven analysis for legal disputes[17] and PEACEGATE[18] for arbitration and mediation.

Virtual Reality (VR) and Augmented Reality (AR)

In VR a computer-generated environment with scenes and objects that appear to be real is created. This makes the user feel they are immersed in their surroundings. The whole process is perceived through a device called VR headset. In AR, digital information is integrated with the user's environment in real time. Unlike VR, AR users experience a real-world environment with generated perceptual information overlaid on top of it. From a user perspective, a special headset device is required for VR, while AR can be accessed even with a smartphone. Both these technologies can create a virtual space for dispute resolution and allows parties to feel as if they are physically close to the situations and evidences being presented. This will enhance communication and improves understanding of disputes better[19]. Further it enables parties to

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[15] Modria Brochure, Tyler Technologies, https://www.tylertech.com/Portals/0/OpenContent/Files/4080/Modria-Brochure.pdf (accessed Feb. 1, 2025).

[16] Cybersettle Makes the Case for Resolving Disputes Online, Mediate, https://mediate.com/cybersettle-makes-the-case-for-resolving-disputes-online/ (accessed Feb. 1, 2025).

[17] LegalMation, LegalMation, https://www.legalmation.com/ (last visited Feb. 15, 2025).

[18] Peacegate International, About Us, Peacegate International (P) Ltd., https://peacegate.in/about-us (accessed Feb. 1, 2025).

[19] Virtual Reality and Augmented Reality: The Virtual Future of Arbitration, Daily Jus, https://dailyjus.com/legal-tech/2024/04/vr-and-ar-the-virtual-future-of-arbitration (accessed Feb. 1, 2025).

participate from different locations and simulates real-world scenarios for dispute resolution as parties visualize outcomes and consequences. Imagine a situation wherein a dispute arises in a construction project due to Extension of Time (EoT) claim associated with a delay in free-issue material. If the project delay associated with the cascading effect of late delivery of the free issue material can be demonstrated with the help of construction sequence and 3D models using AR or VR technology, the resolution of the dispute become much easier in real life, as the root cause for the dispute can be proven unequivocally. Such an approach can also reduce the number of hearings substantially.
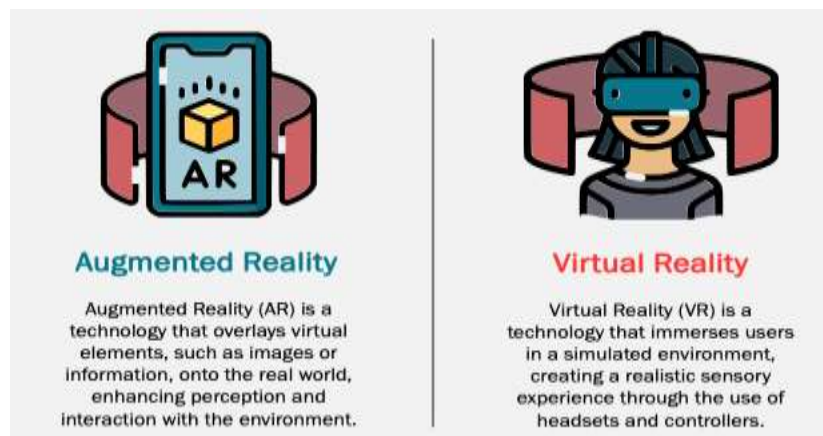

Augmented Reality

Augmented Reality (AR) is a technology that overlays virtual elements, such as images or information, onto the real world, enhancing perception and interaction with the environment.

Virtual Reality

Virtual Reality (VR) is a technology that immerses users in a simulated environment, creating a realistic sensory experience through the use of headsets and controllers.

Figure 3: Augmented Reality Vs Virtual Reality [20]

Blockchain technology – Concepts of Smart Contracts and Crowd Arbitration

Of late, block chain technology is being used in various e-commerce transactions. Imagine a situation where in someone want to maintain a reliable ledger for maintaining transactions happenings around the world. The conventional method of doing this task is to send the transaction details to one centralised server and consolidate the details at the server level. However, if this is to be done at real-time without losing the reliability of the transaction data, we can apply blockchain technology. For the above case, let us assume that a digital ledger similar to a notebook that records transactions is to be maintained. In blockchain, this ledger is distributed across many computer processers around the world and data are not stored in one place. And also, each associated computer has a copy of this ledger, making each computer in the chain has the latest ledger. Further, all computers in blockchain work together to ensure that the information is accurate, latest and secure. When someone wants to do a

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[20] SketchBubble, Augmented Reality vs. Virtual Reality, https://www.sketchbubble.com/en/presentation-augmented-reality-vs-virtual-reality.html (last visited Feb. 15, 2025).

transaction, like receiving money, it gets recorded in a "block" similar to a new page in the physical notebook. Before this block is added to the ledger, it will be verified by multiple computers of the existing chain called nodes. They check if the transaction is valid. Once verified by the existing nodes, the block is added to a chain of previous blocks, expanding the "blockchain." In this technology, each block is linked to the previous one, making it very hard to alter any information. Thus, blockchain data are considered to be secure. If someone tries to change the data of a block, all the other computers of remaining blocks will notice the same and reject such change. In crux, blockchain technology is a secure, transparent, and decentralized way to record any transactions. It's used in various applications, from cryptocurrencies like Bitcoin to supply chain management and beyond[21].

Application of blockchain in supply chain management is worth exploring further as majority of the disputes are arising out of contracts. Smart contracts, widely used in supply chain management field functions based on blockchain technology. They are self-executing contracts normally used for standard but bulk transactions. Further, these types of contracts can automatically enforce and execute the terms of contract when certain predefined conditions are met. And such predefined conditions and terms of the agreement are directly written into computer algorithm of the associated smart contract. In other words, Smart contracts automate the processes, reducing the need for intermediaries and manual intervention, hence the name smart contracts. These contracts use a blockchain network. Once deployed through a blockchain network, contract terms become part of the blockchain and is accessible to relevant participants in the network. The predefined conditions of smart contracts could be transferring of funds, releasing of goods, or updating of records and when such predefined conditions are met, the smart contract automatically executes the agreed-upon actions. Once a smart contract is deployed, it cannot be altered. This ensures that the terms are enforced exactly as written, without leaving any possibility of tampering of records. So, in normal context, smart contracts are suitable for general and standard transactions, which requires high level of security. All parties involved in smart contract can see the terms of the contract and the conditions for execution, hence full transactions are transparent for the parties involved in the smart contract. By automating the processes, smart contracts can significantly speed up transactions and reduce costs. Payment of road toll charges through Fastag can be considered an example of a smart

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[21] Hiroo Advani, Asif Lampwala & Ria Garg, Smart Contracts and Blockchain Arbitration: Smart Solutions Paving the Way for a Better Dispute Resolution Mechanism, SCC Online Blog (April 25, 2022), https://www.scconline.com/blog/post/2022/04/25/smart-contracts-and-blockchain-arbitration-smart-solutions-paving-the-way-for-a-better-dispute-resolution-mechanism/.

contract. Ethereum is one of the most popular blockchain platforms for creating and deploying smart contracts[22]. It provides a decentralized virtual machine (EVM) that can execute smart contracts using its native cryptocurrency, Ether (ETH).

As smart contracts are generally deployed for standard and bulk transactions, the disputes arising out of these transactions are also of standard in nature[23]. At times, there could be invariably high number of similar disputes. Blockchain technology can be used for resolving such disputes. For instance, when a dispute case is filed, a new block is created with details like the case number, parties involved, and initial documents. Each piece of evidence submitted, like documents, photos or videos is recorded in a new sub-block of the case. This sub-block includes a timestamp and a unique identifier, ensuring the evidence is tamper-proof. Testimonies of the case are also recorded in sub-blocks. Each testimony sub-block is linked to the previous testimony sub-blocks, creating a chronological chain of events. Every order of award is added as a new sub-block. This ensures that all decisions are transparent and cannot be altered after the fact. Just like in the financial ledger example, multiple nodes verify each sub-block before it is added to the chain. This makes the entire process transparent and secure. Each block will be a case and sub-blocks its various stages.

Another way to utilise blockchain technology for dispute resolution is by means of crowd arbitration[24]. Though in its nascent stage, crowed arbitration has got potential to progress in a big way. Crowd arbitration is based on expert pooling, and it utilise the collective intelligence and decision-making power of a large group of experts to resolve disputes[25]. This type of dispute resolution applies game theory principles to design dispute resolution mechanisms. The participants in a crowd arbitration process, are a pool of arbitrators acting as experts. This pool of arbitrators provides insights, preferences and decisions for dispute resolution. Crowd arbitration, as the name suggests, involves many such arbitrators who contribute their opinions, decisions and votes to reach a fair and unbiased outcome as dispute resolution. Blockchain technology augments this process by providing a secure, transparent, and decentralized platform. Decentralized structure of blockchain technology ensures transparency and data

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[22] Ethereum Foundation, Ethereum, https://ethereum.org/en/ (last visited Feb. 15, 2025).

[23] Michael Buchwald, Smart Contract Dispute Resolution: The Inescapable Flaws of Blockchain-Based Arbitration, 168 U. Pa. L. Rev. 1369 (2020).

[24] Christoph Salger, Decentralized Dispute Resolution: Using Blockchain Technology and Smart Contracts in Arbitration, 24 Pepp. Disp. Resol. L.J. 65 (2024).

[25] Leonora Camner, Crowd Arbitration: Crowdsourced Dispute Resolution, Disputing Blog (Mar. 27, 2014), https://disputingblog.com/wp-content/uploads/2014/03/Leonora-Camner_Crowd-Arbitration-Crowdsourced-Dispute-Resolution.pdf.

security. Further smart contracts are used for enforcing rules and outcomes automatically. Thus, combining crowd arbitration with blockchain technology leads to more efficient, fair, and secure dispute resolution[26].

Machine Learning (ML), Artificial Intelligence (AI) and Artificial General Intelligence (AGI)

Machine Learning is considered as a first stage in the evolution of artificial intelligence applications. ML use mutation-based search mechanisms to improve Natural Language Processing (NLP) of computer systems[27]. As the name suggests, ML focuses on enabling systems to learn from data and improve through experience over time without any sort of explicit programming. ML models involve steps like data collection, data preparation, model training, model evaluation and model improvements etc in closed dynamic loop[28]. In more common language, this means, data are saved in a machine, and based on how this data is being used, the machine itself is learning how to utilise the relevant data. Intelligent processing of the data is involved rather than mere storage of data. Hence, in the context of ADR, we can utilise ML to enhance various ADR processes and make those processes more effective. For instance, ML algorithms can analyse huge historical case data to identify patterns and predict outcomes. Such patterns and predictions will help ML itself to suggest optimal solutions for disputes. Additionally, ML can be used for automating tasks such as document analysis, sentiment analysis, and decision support[29]. All these tasks are tedious and time consuming for human arbitrators and mediators and hence ML can be used for reducing the workload. Similar to any technological development, by integrating ML into ADR systems, disputes can be resolved more quickly, accurately and efficiently and thus by improving access to justice and overall satisfaction with the resolution process.

As of now, ML is the foundation and critical component of AI, and its advancements have paved the way for more sophisticated AI applications. In the context of ADR, integrating machine learning to ADR represents an initial step toward creating intelligent systems that can

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[26] Yannick Gabuthy, Blockchain-Based Dispute Resolution: Insights and Challenges, 14 Games 34 (2023), https://doi.org/10.3390/g14030034.

[27] David Horton, Forced for Arbitration, 109 Cornell L. Rev. 679 (2024).

[28] Lola Akin Ojelabi, John Zeleznikow, Louis De Koker & Fahimeh Abedi, Dispute Resolution Practitioners, Online Technologies and COVID-19: Findings from Empirical Research on Use of Technology, 49 MONASH U. L. REV. 225 (2023).

[29] Ellen Waldman, How Mediation Contributes to the "Justice Gap" and Possible Technological Fixes, 88 Fordham L. Rev. 2425 (2020).

analyse data, predict outcomes, and assist in decision-making, ultimately contributing to the evolution of AI-driven solutions[30].

Next stage in the technological development after machine learning is Artificial Intelligence [31]. ML is more inclined to data interpretation and analysis by applying statistical methods such as pattern recognition, classification, and regression etc where it can learn from and adapt to new data without human intervention. At the same time, AI has the significant ability to make machines mimic human intelligence in addition to what ML can normally do. This includes learning from experience, understanding language, recognizing patterns, solving problems, and making decisions. Needless to say, AI encompasses a wider range of technologies and approaches aimed at simulating human-like intelligence as it aims to simulate human cognition to create machines that can carry out complex functions in an intelligent manner. Further, AI encompasses a wide range of techniques and approaches including but not limited to that of ML, natural language processing, robotics, and computer vision. AI can use rule-based systems, logic, and heuristics to achieve intelligent behaviour, aside from learning-based methods. AI tools are in development stage and they are being designed to copy human intelligence and perform complex tasks such as planning, understand the contexts, and take decisions based on such contexts. As of now, AI is used in a wide variety of applications, such as virtual assistants, autonomous vehicles, and robotics. While ML is a crucial component of AI, AI covers a broader range of technologies and methodologies aimed at creating intelligent systems. ML compliments the functionality of AI, which is represented as "AI onion" as below

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[30] John Morison & Adam Harkens, Re-Engineering Justice: Robot Judges, Computerised Courts and (Semi) Automated Legal Decision-Making, 39 Legal Stud. 618 (2019).

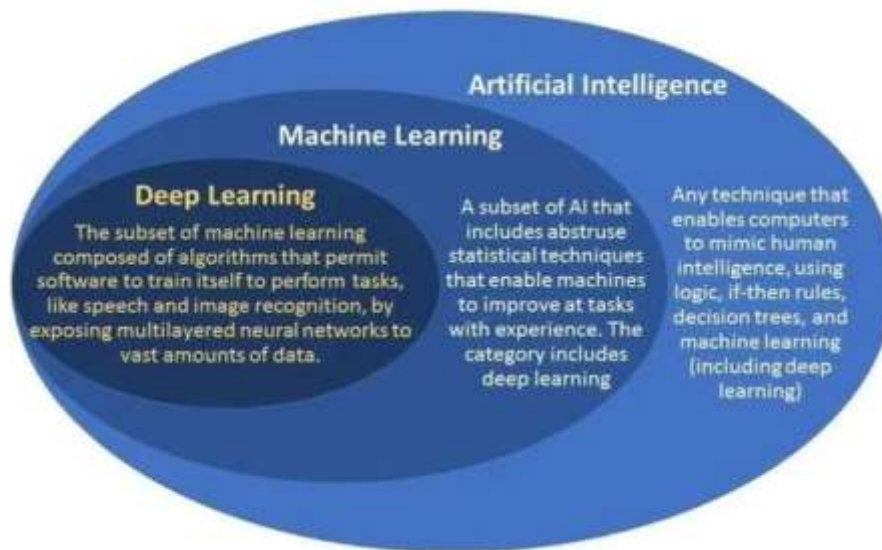[31] Nadja Alexander, Ten Trends in International Commercial Mediation, 31 SAcLJ 405 (2019).

Figure 4: The concept of AI Onion[32]

In the field of ADR, AI-driven tools are being used for facilitating ODR process as AI algorithms can interpret and analyse historical case data to predict dispute outcomes. In the field of negotiation and mediation, AI tools have the capabilities to automate the processes. They can also suggest optimal resolutions during the ADR stages. This will help to reduce the workload on human facilitators and mediators. AI-powered virtual mediators are common in the mediation process conducted through latest ODR platforms. AI tools use natural language processing to understand and interpret statements. Once they understand statements provided by the parties engaged in disputes, AI tools are capable of providing neutral and unbiased supports. These virtual mediators are also capable of suggesting possible resolutions. Further, they can facilitate negotiations, and help parties to reach mutually agreeable solutions fairly quickly. In arbitration arena, AI arbitrators can support human arbitrators in decision making process by generating suitable recommendations. AI tools have the capabilities to generate logical recommendations fairly quickly based on evidence and data analysis, and applying legal principles[33]. Human arbitrators can review such recommendations to make the final decision[34]. The application of AI in ADR process has been proven as countries like China and Estonia

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[32] AI for Lawyers: Artificial Narrow, General Intelligence & Super Intelligence, Lawtomated, https://lawtomated.com/ai-for-lawyers-ani-agi-and-asi/ (last visited Feb. 15, 2025).

[33] Anjanette H. Raymond & Scott J. Shackelford, Technology, Ethics, and Access to Justice: Should an Algorithm Be Deciding Your Case, 35 Mich. J. Int'l L. 485 (2014).

[34] Gizem Halis Kasap, Can Artificial Intelligence ("AI") Replace Human Arbitrators? Technological Concerns and Legal Implications, 2021 J. Disp. Resol. (2021), available at https://scholarship.law.missouri.edu/jdr/vol2021/iss2/5.

have already established digital tribunals and courts with AI judges to resolve disputes[35]. When blockchain technology is integrated with AI, the combined ODR tool can provide a transparent, secured, and immutable ADR process. There are numerous ODR platforms where AI is being used along with other technologies for various stages of dispute resolution process. These advancements make ADR more accessible, cost-effective, and capable of handling complex disputes in a timely manner[36].

Further moving forward with technological developments, Artificial General Intelligence (AGI) is considered as the next generation AI[37]. Though the technology is in the development stage, conceptual AGI has a significant improvement over traditional AI. In simple words, the main difference is that the "degree of humanity" is substantially higher for AGI than for traditional AI. Narrow AI tools are developed to perform specific tasks, which make each AI tool a trained specialist in a particular field. However, AGI tools have the capability to understand, learn from such understandings, and apply the knowledge thus earned across a wide range of tasks at a level comparable to human intelligence. Broader and more flexible but "general" intelligence allows AGI to handle complicated and diverse situations much like an intelligent human would handle[38]. Therefore, this makes AGI more apt for addressing difficult and context-rich situations, such as those often encountered in ADR. This means, AGI tools can be used for a potential transformation in ADR process. AGI can analyse more complicated disputes, wherein analysis and interpretation by human could have tave taken substantial effort and time. AGI tools are also capable to provide detailed and context-aware solutions, ensuring fairer outcomes. One of the significant advantages of AGI in ADR is speedy handling of complex disputes. However, path forward for AGI is yet to be cleared further. There are significant technical, ethical, societal, legal and regulatory challenges to overcome. Major tech companies like OpenAI, Microsoft, Deepseek and Google are heavily investing in related research and development activities. Therefore, in current context, achieving true AGI remains a complex and ongoing mission.

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[35] Felicity Bell et al., AI Decision-Making and the Courts: A Guide for Judges, Tribunal Members and Court Administrators, Australasian Institute of Judicial Administration (2022), available at https://aija.org.au/wp-content/uploads/woocommerce_uploads/2022/06/AI-DECISION-MAKING-AND-THE-COURTS_Report_V5-2022-06-20-1lzkls.pdf.

[36] Ngo Nguyen Thao Vy, AI Implementation in ODR: A Game-Changer or a Troublemaker of Data Protection, 8 Vietnamese J. Legal Sci. 1 (2023), available at https://sciendo.com/article/10.2478/vjls-2023-0001.

[37] Scott J. Shackelford & Anjanette H. Raymond, Building the Virtual Courthouse: Ethical Considerations for Design, Implementation, and Regulation in the World of ODR, 2014 Wis. L. Rev. 615 (2014).

[38] Kenny Truong, Expanding Nonobviousness to Account for AI-Based Tools, 104 J. Pat. & Trademark Off. Soc'y 51 (2024).

TECHNOLOGY IN ADR: PERKS AND POTENTIAL

Each technology has its own specific characteristic. To explore maximum benefit of the available technologies, it is imperative to design an ODR platform having sufficient capabilities to integrate many of them and use them as appropriate according to the nature of dispute[39]. Each dispute is considered to be unique and hence the extend of realisation of such benefits would depend on the type of disputes being handled. Together, all these technologies improve the efficiency, and overall user experience of the dispute resolution process. Cost benefits and shortened duration of ADR process are other advantages[40]. The use of AR and VR technologies can permit parties to engage in virtual but face-to-face interactions. Same can also lead to increased emotional engagement and better communications, which could aid the bi-lateral dispute resolution process. Blockchain technology's characteristics of security, decentralisation and immutability are particularly advantageous for standard type of disputes, disputes arising from smart contracts and crowd arbitrations. AI feature of the ODR platform can be deployed to analyse vast amounts of data, providing mediators and arbitrators with real-time insights and predictive analytics. This can help in identifying potential areas of conflict, assessing the likelihood of various outcomes, and suggesting the best course of action based on historical data.

While many of the features of the latest technologies may not exist in any ODR platforms today, but their developments are ongoing. This stage promises a future where technology and ADR are seamlessly intertwined. Looking towards the future potentials of technology integration to ODR, various permutations and combinations of technology integrations are possible. Future will be evolved based on the real requirements. Imagine a world where AI-driven virtual assistants, which has enough knowledge about the cases, guiding participants through every step of the dispute resolution process. AR and VR could potentially evolve to create fully interactive virtual courtrooms similar to a newsroom, where participants not only see and hear each other but also interact with virtual evidence and exhibits. Decentralised characteristics of blockchain technology could be used to develop smart contracts based Decentralized Autonomous Organizations (DAOs). DAOs are proven to helpful for community-driven voting process. In ADR, the same can be adopted, where participants have

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[39] Lyle Moran, Lawyers and Judges Optional? Online Dispute Resolution Promises to Increase Access to Justice, but Challenges Remain, 107 A.B.A. J. 58 (2021).
[40] Sharad Dave & Siddharth Misra, An Analysis of Online Dispute Resolution in India with Special Emphasis on the Impact of Covid-19: Opportunities and Obstacles, 3.3 J. Contemp. Legal Issues 507 (2023)

a direct say in the mediation process through voting. AI could be used as an advance tool for legal researches associated with ADR. AI has the capabilities to efficiently browse through legal texts, case laws, and regulations and provide precise and relevant information to mediators, facilitators arbitrators and disputants in a very short period. Additionally, AI feature of ODR platform could bring in emotional and human elements into ADR process. All these would streamline the preparation process, ensure that decisions are well-informed, and potentially uncover precedents that might otherwise be overlooked.

CONTRACTUAL FREEDOM AND TECHNOLOGICAL INTEGRATION IN ADR

Majority of the disputes of ADR are normally arising out of contracts. The agility of ADR processes to adapt to new technologies is governed by the doctrine of privity of contract and principle of party autonomy. These concepts in contract law uphold that the agreements made between parties are binding only to them, allowing them the freedom to frame terms and conditions of their contracts without external interference[41]. In a practical sense, dispute resolution clause of the contract can categorically mention the agreement to utilize advanced technologies. By specifically incorporating the use of these technologies into the dispute resolution clause, parties can ensure that their ADR process is both flexible and innovative. Tech savvy parties can agree to further narrow down this clause. For instance, in the ADR clause, they can specify an ODR platform with virtual meeting capabilities for hearings, blockchain technology for secured form of record-keeping, and AI tools for data analysis and decision supports etc to facilitate efficient and effective dispute resolution process. This type of agility and contractual adaptability aids ADR processes to integrate innovative solutions and evolve further without being affected by any legal or regulatory constraints[42].

As long as the disputants agree to utilize advanced technological tools, ADR can be considered as dynamic and adaptable. Such an ADR tool is capable of providing a speedier, efficient and cost-effective resolution of disputes. This adaptability is particularly beneficial in an increasingly digital world, where traditional judicial systems may lag in accommodating rapid technological advancements. Thus, the inclusion of a well-crafted dispute resolution clause in

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[41] Privity and Arbitration Agreements, Singapore International Arbitration Centre, https://singaporeinternationalarbitration.com/2013/06/17/privity-and-arbitration-agreements/ (last visited Feb. 15, 2025).
[42] Marja Boman, Privity of Contract and Multi-Party Arbitration, Edilex (2016), https://www.edilex.fi/artikkelit/16836.

the main contract can pave the way for embracing new technologies, ensuring a more efficient and equitable resolution process for all parties involved.

CHALLENGES IN TECH-ENHANCED ADR

The integration of advanced technologies into ADR processes brings in several challenges. The first and foremost one is the concerns about data privacy and security. As technology improves, today's strict privacy and high security may become obsolete and vulnerable in the near future. Though blockchain technology can offer enhanced security through its decentralized nature, for the technology to perform, it requires powerful and robust mechanisms to maintain the integrity of the system and prevent potential vulnerabilities. Facilitating a robust and secured platform for block chain is a challenge.

AI technology is still being developed. So, the fairness, dependability and reliability of AI-driven decisions pose significant questions. There are no baselines existing to verify the correctness. It is a fact that AI can analyse vast amounts of data and provide valuable recommendations. However, at times the outcomes could be unrealistic or skewed due to improper algorithms, underdeveloped or not trained tools.

Another significant, but a work culture related challenge is the resistance from traditional ADR practitioners to the technological change. They may be reluctant to accept changes in the way they work, like integrating new technologies into an established process they have been practicing for a long time. They may be fearing that a tech savvy ADR tool may weaken the human element of dispute resolution. Overcoming such resistance requires well thought about education and training programs. Such programs to be designed for helping the practitioners understand the benefits and limitations of various ODR tools and how they can enhance, rather than replace the traditional ADR methods. Additionally, there is a need to develop clear regulatory frameworks that address the legal implications of using such technologies in ADR, ensuring that they comply with existing laws and standards while fostering innovation.

CONCLUSIONS

The rapid advancement of technology has resulted in significant transformation to the landscape of legal profession in general and ADR profession in particular. In relation to such a theme, this paper has explored the historical evolution of modern ADR, the key technological advancements, and their specific applications within ADR processes. The paper has also

provided emphasis on the strengths of each modern technology and how such technologies can be integrated to an appropriate ODR platform.

Reinforced by the privity of contracts and party autonomy, the principle of contractual freedom allows ADR to seamlessly integrate new technologies without encountering significant legal or regulatory constraints. The disputants can tailor-fit their dispute resolution processes as this privity of contract and party autonomy principles allows the parties to take advantage of the latest technological innovations.

However, the integration of these new technologies also brings in new challenges. Challenges include concerns about data security and privacy, the fairness, dependability and reliability of AI-driven decisions, and resistance from traditional ADR practitioners etc. By recognizing and addressing these hurdles, the ADR practitioners can develop a more transparent, inclusive, and reliable dispute resolution environment. The ongoing technological and scientific developments are promising for the future of ADR. Such developments will help ADR profession to adapt and flourish in an increasingly digital world. Embracing these modern technologies and addressing the associated challenges, will benefit ADR, because such an attempt can continue to provide efficient and equitable solutions for resolving disputes, ultimately contributing to a more just and efficient legal system.