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SPECIAL SECTION

BEYOND TRADITIONAL CONTRACTS: THE LEGAL RECOGNITION AND CHALLENGES OF SMART CONTRACTS IN MALAYSIA AND SINGAPORE

Abstract

The dawn of blockchain technology and smart contracts has instigated a transformative shift in digital transactions, challenging and expanding legal boundaries in both Malaysia and Singapore. This paper examines how these common law jurisdictions have adapted to these challenges, integrating traditional legal frameworks with the distinct characteristics of blockchain, such as automation, decentralisation, and cost efficiency. Through an analysis of key legal cases, the study demonstrates the adaptability of common law in responding to technological innovations.

A key focus is placed on the application of smart contracts in sectors such as Islamic finance, where both common law and Sharia law coexist. Malaysia and Singapore offer unique examples of legal pluralism, having successfully harmonised these legal systems even before the advent of smart contracts. The integration of smart contracts into these frameworks showcases the ability of these jurisdictions to balance innovation with tradition, effectively governing both conventional and digital transactions.

However, the paper identifies significant legal uncertainties, particularly concerning the enforceability of smart contracts, mechanisms for dispute resolution, and the integration of digital assets into existing legal norms. Rather than advocating comprehensive reforms, the paper suggests targeted regulatory updates and strategic legal guidelines to address these issues. By adopting this approach, Malaysia and Singapore can strengthen their legal systems to fully harness the potential of blockchain and smart contracts. Through comparative analysis and empirical case law, the study highlights how these jurisdictions can remain at the forefront of legal and technological innovation in Southeast Asia.

SUMMARY

1 Introduction – 2 Smart Contract vs Traditional Contract – 2.1 The self-executing nature of smart contracts and their enforceability - 2.2 The interpretation of Smart Contract - 3 Legal position of smart contracts in Singapore - 3.1 Case analysis - 3.2 Clear position or unleashing a floodgate? – 4 Legal positions of smart contract in Malaysia – 4.1 Case Analysis - 5 The diverse applications of smart contracts across industries – 6 The adaptability – 7 Technological neutrality versus operational specificity – 8 Conclusion

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1 Introduction

The blockchain technology introduced by Satoshi Nakamoto's seminal 2008 white paper[1] has ignited a global re-evaluation of traditional financial and transaction systems. This technological innovation has not only established the foundation for cryptocurrencies but has also facilitated the broader adoption of blockchain technology across various domains. This is achieved through the use of peer-to-peer networks, digital signatures, and a proof-of-work/proof-of-stake mechanism, enabling electronic transactions without the necessity for trusted intermediaries. Among these applications, smart contracts stand out for their ability to automate complex agreements with precision and enforceability[2], mirroring the impact of the Transmission Control Protocol/Internet Protocol (TCP/IP) on the development of the Internet[3]. However, it is important to recognise that the rigidity of smart contracts can be a challenge for certain complex agreements. The focus is on how smart contracts excel within their predefined parameters. While they offer significant advantages in automation and precision, it is crucial to consider their current limitations regarding flexibility when applying them to highly complex or adaptive contracts.

There are various advantages to using smart contracts, including enhanced transparency, reduced transaction costs, faster settlements, user-controlled networks, and a shift towards decentralisation[4]. Additionally, the open-source nature of the distributed ledger and its elimination of intermediaries streamline transactions, providing high security through their decentralised structure. This model promotes a system that is theoretically centralised but politically and architecturally decentralised, disrupting conventional models and offering a cohesive computing framework that is resilient against single points of failure[5].

Despite the swift growth of the digital economy in Malaysia and Singapore, the disruptive nature of smart contracts and blockchain technology also raises some concerns regarding legal and regulatory aspects. These technologies continue to be bound by a legal and regulatory environment that is continually evolving, therefore it is important to examine how these technologies fit into the current legal framework and what amendments may be needed to account for their special attributes.

Our paper seeks to explore the legal position by examining the existing case law related to smart contracts and blockchain technology. We specifically aim to address the question: How do the current legal frameworks in Malaysia and Singapore accommodate the unique

[1] S Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System' [2008] Decentralized Business Review 1.
[2] A Savelyev, 'Contract Law 20: "Smart" Contracts as the Beginning of the End of Classic Contract Law' (2017) 26(2) Information & Communications Technology Law <https://doi.org/10.1080/13600834.2017.1301036> accessed 2 March 2024.
[3] Richard W Stevens, *TCP/IP Illustrated*, Volume 1: The Protocols (Addison-Wesley 1994).
[4] Y Li, W Yang, P He, C Chen and X Wang, 'Design and Management of a Distributed Hybrid Energy System through Smart Contract and Blockchain' (2019) 248 Applied Energy 390, 405.
[5] M M Abu-Bakar, *Shariah analysis of bitcoin, cryptocurrency, and blockchain. Shariah Analysis in Light of Fatwas and Scholars* Opinions 14, 19. (Blossom Labs, Inc 2018); J Poon and V Buterin, 'Plasma: Scalable Autonomous Smart Contracts' (White paper, 2017).

features of blockchain and smart contracts, and what legal and regulatory challenges do these technologies pose within these jurisdictions?

Through our investigation, the paper will delve into the benefits and challenges presented by blockchain and smart contracts, examine the existing legal frameworks in Malaysia and Singapore, and propose recommendations for addressing the identified legal and regulatory challenges. We believe that this analysis is crucial for understanding the implications of these technologies for the future of digital transactions and agreements in both countries, setting a precedent for legal and regulatory adaptations in the digital age.

2 Smart contract vs traditional contract

The origin of the “smart contract” term was coined by Nick Szabo as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises"[6]. Szabo emphasised the increased functionality of smart contracts compared to non-coded contracts and consequently did not assume a detachment from the law. In light of this, a smart contract is nothing more than the encoding or digital memorialisation of a contract or parts thereof. Its legal evaluation depends on the law applicable to the underlying contract. Naturally, the conclusion of a contract and its digital representation in a smart contract can coincide. However, most smart contracts will most likely be based on an additional written or electronic agreement in natural language.

Smart contracts and traditional contracts exhibit notable differences. In the formation of a classic contract, it must contain these requisites: offer, acceptance, and consideration, which are typically fulfilled by the document being physically signed. In the event of a breach, the wronged party usually takes the other party to court or arbitrates the dispute to enforce the terms of the contract or to receive compensation from the breaching party. Similarly, disputes over the interpretation of a term may require a third party (such as a court, arbitrator, or pre-agreed authority) to make the final decision to settle the issue[7]. This may involve several third parties, lawyers representing each contracting party, and a judge/arbitrator, resulting in an inevitably costly and time-consuming dispute resolution process. Even with a favourable judgement/award, execution may still be a challenging last step.

In contrast, smart contracts operate differently. By utilising technology to encode contracts, parties avoid the ambiguity that could arise when obligations are

[6] N Szabo, ‘Formalizing and Securing Relationships on Public Networks’ (1997) 2(9) First Monday <https://firstmonday.org/ojs/index.php/fm/article/view/548> accessed 10 October 2024 ; Nick Szabo, *Smart Contracts: Building Blocks for Digital Markets* (1996) 1, 5.

[7] M Kasatkina, ‘Dispute Resolution Mechanism for Smart Contracts’ (2022) 16(2) Masaryk University Journal of Law and Technology 143, 162; A Schmitz and C Rule, ‘Online Dispute Resolution for Smart Contracts’ [2019] J Disp Resol 103.

expressed in traditional contract terms[8]. This clarity is achieved through smart contracts, which are computer programs comprised of "if/then" clauses detailing every obligation and possible situation. Once established and legally agreed upon by all parties, these smart contracts operate on the principle of self-enforcement[9]. In the context of smart contracts, "self-enforcement" refers to the automatic execution of transactions involving cryptocurrency or crypto assets when predetermined conditions are met. This feature ostensibly removes the need for human intervention in the performance of contractual duties, leveraging the immutable nature of blockchain technology to prevent parties from reneging on their commitments due to deliberate refusal or human error. Consequently, it is posited that the deployment of smart contracts on a blockchain eliminates the potential for contractual breaches by the parties involved.[10]

Unlike conventional contracts, which often rely on intermediaries for enforcement and dispute resolution, smart contracts are executed and enforced by the code itself, directly on a blockchain. This shift not only enhances trust between parties by ensuring compliance through code but also streamlines transactions by removing the need for third-party involvement[11].

Feature	Smart Contracts	Traditional Contracts
Digital Lifecycle	Entirely online, without the need for external entities.	Often occur offline or require manual intervention.
Automated Execution	Executed by automated systems according to pre-programmed rules.	Execution may involve discretion, reasonableness, or judgement. Described in human languages.
Immutable Record	Cannot be altered once deployed; adjustments require a new contract.	Can be modified through amendments or renegotiations.

[8] JM Sklaroff, 'Smart Contracts and the Cost of Inflexibility' (2017) 166 U Pa L Rev 263; E Mik, 'Smart Contracts: Terminology, Technical Limitations and Real World Complexity' (2017) 9(2) Law, Innovation and Technology 269, 300; C Poncibò, L Di Matteo and M Cannarsa, *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2019); P De Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (Harvard University Press 2019).

[9] M Raskin, 'The Law and Legality of Smart Contracts' (2016) 1 Geo L Tech Rev 305.

[10] P Ortolani, 'Self-Enforcing Online Dispute Resolution: Lessons from Bitcoin' (2016) 36(3) Oxford Journal of Legal Studies 595, 629.

[11] S Wang and others, 'Blockchain-Enabled Smart Contracts: Architecture, Applications, and Future Trends' (2019) 49(11) IEEE Transactions on Systems, Man, and Cybernetics: Systems 2266, 2277.

Binary Outcomes	Perform actions based on clear, algorithmically determinable conditions.	Outcomes may depend on complex conditions or subjective assessments.
Trust	Trust in the smart contract and codes.	Trust in one another or intermediaries.
Reduced Transaction Costs and Risks	Potentially lower costs by automating execution and enforcement, minimise risk of defective performance, and address informational asymmetry.	Higher transaction costs due to manual processes and risk of non-performance or disputes.

The various types of smart contracts[12] span a spectrum, accommodating various needs and preferences, including:

- Pure Code Contracts (Mere Code): At one end of the spectrum, smart contracts exist solely as code on the blockchain, with no accompanying legal agreement. These contracts represent mere transactions in the technical sense, focused solely on automated execution without any legal implications or natural language terms. This format is ideal for parties seeking to bypass intermediaries entirely, relying solely on the blockchain's distributed ledger technology.
- Code-Enhanced Traditional Contracts: A tool to execute a legal agreement, with the legal agreement existing off-chain. This approach incorporates coded clauses within conventional contracts, enabling certain operations or entire contract executions on the blockchain while maintaining the traditional format.
- Hybrid or Merged Contracts: A smart contract that either constitutes a legally binding declaration of will (such as an offer or acceptance) or merges with the legal agreement to exist simultaneously both on-chain and off-chain. In this form, the smart contract can be partially or fully integrated with the legal agreement, and it should be determined by the parties whether the agreement should be treated primarily as on-chain or off-chain.
    - Ricardian Contracts: Although some do not regard Ricardian contracts as smart contracts in the strict sense, they are often discussed within this category. Ricardian contracts bridge traditional legal agreements and

[12] G Dobrauz-Saldapenna and MA Schrackmann, 'Economics of Smart Contracts: Efficiency and Legal Challenges' in *Disintermediation Economics: The Impact of Blockchain on Markets and Policies* (Springer International Publishing 2021) 33, 46; UK Jurisdiction Taskforce of the Lawtech Delivery Panel, Public Consultation: The Status of Cryptoassets, Distributed Ledger Technology and Smart Contracts under English Private Law (May 2019) 'Lawtech Delivery Panel, Public Consultation' 31 and 32; European Law Institute, 'ELI Principles on Blockchain Technology, Smart Contracts and Consumer Protection' (2023) <https://www.europeanlawinstitute.eu/fileadmin/user_upload/p_eli/Publications/ELI_Principles_on_Blockchain_Technology__Smart_Contracts_and_Consumer_Protection.pdf> accessed 25 July 2024.

> blockchain execution, including both human-readable text (legal terms) and machine-readable code that can be executed on a blockchain. This hybrid nature facilitates understanding by the parties and automated enforcement of certain aspects.

Hence, the three key characteristics that distinguish smart contracts are immutability, automation, and decentralisation. Smart contracts are crafted to operate independently based on predetermined conditions, leveraging blockchain technology to facilitate transactions securely and transparently without the need for intermediaries[13]. Smart contracts are designed to be immutable once they are activated, which ensures strict adherence to predetermined terms. These contracts abide by the terms they were designed to autonomously supervise, carry out, or record events and actions that have legal consequences. The technology is versatile, embracing both contracts solely based on code and hybrid forms that integrate natural language to enhance legal comprehension. Additionally, the security of blockchain-recorded data is reinforced by decentralized nodes and hashing techniques, rendering unauthorised access or alterations to the decentralized ledger notably difficult[14]. This framework not only solidifies the security paradigm of blockchain transactions but also underscores the intricate balance between technological innovation and enforceability in the realm of digital contracts.

2.1 The Self-Executing Nature of Smart Contracts and Their Enforceability

Smart contracts represent a significant innovation in the digital age, automating the execution of contractual terms upon the fulfilment of predefined conditions. This mechanism eliminates the possibility of voluntary breaches, as exemplified in a scenario where a smart contract facilitates a transaction between two parties, such as Party A agrees in exchange for Party B's services to pay a fee of £430. By using a smart contract, which is similar to an escrow manager, the fee of £430 paid by A will be released to B when A is satisfied with the services provided by B[15]. This self-executing functionality automatically carries out the agreed-upon actions without requiring external intervention.

This functionality suggests a potential future where smart contracts could supplant certain traditional legal functions, including those performed by transactional lawyers. Blockchain technology underpins the creation of smart contracts, serving as a digital ledger that records any amendments to the contracts or their terms. Real-world applications, such as Etherisc's development of index-based insurance products on the

[13] F Rahman, C Titouna and F Nait-Abdesselam, 'Fundamentals of Blockchain and Smart Contracts' in *Blockchain and Smart-Contract Technologies for Innovative Applications* (Springer Nature Switzerland 2024) 3, 37.
[14] JM Sklaroff (n 8) 263; KJ Yong, ES Tay and DW Khong, 'Application of Blockchain Smart Contracts in Smart Tenancies: A Malaysian Perspective' (2022) 8(1) Cogent Social Sciences 2111850.
[15] B C Cheong and H Kishen, 'Legal Risks beneath Blockchain-Enabled Smart Contracts' (The Singapore Law Gazette, 23 January 2021) <https://lawgazette.com.sg/feature/legal-risks-beneath-blockchain-enabled-smart-contracts> accessed 29 January 2024.

Ethereum blockchain, demonstrate the practical utility of smart contracts[16]. For example, Etherisc's decentralised application (dApp) for flight delay and cancellation insurance automates premium payments and claims based on specific flight status changes, showcasing a more efficient and direct process compared to traditional insurance models[17].

Despite their potential, smart contracts face challenges regarding enforceability and adaptability, particularly in sustaining long-term commercial relationships characterised by complexity and the need for flexibility. Critics argue that the term "enforcement" might be misleading when applied to smart contracts as traditional enforcement mechanisms involve state intervention to protect contractual rights[18]. The binary logic of smart contracts, which operates without discretion, struggles to accommodate the fluid dynamics of ongoing business relationships, that often rely on negotiation and adjustment[19]. This limitation highlights the difference between self-execution, which is the automatic performance of contract terms based on predefined conditions, and self-enforceability, which concerns the ability to ensure compliance and address non-performance. In the latter, the code ensures compliance by preventing breaches through blockchain immutability[20], but this doesn't guarantee legal enforceability under traditional laws, which still need to adapt to smart contracts[21].

Moreover, the immutable and transparent nature of smart contracts, while advantageous for security and efficiency, presents difficulties in integrating these digital agreements into the existing legal frameworks, which are designed to manage disputes and relationships with a degree of subjectivity[22]. Undoubtedly, coding errors, unforeseen situations, or misinterpretation of coded terms may cause potential disputes, highlighting a need for innovative dispute resolution mechanisms designed for smart contracts[23].

Many scholars have explored ways to resolve disputes arising from smart contracts. Kasatkina[24] suggests a hybrid model combining traditional arbitration with blockchain online dispute resolution (ODR) to address smart contract disputes, leveraging the

[16] C H Hoffmann, 'A Double Design-Science Perspective of Entrepreneurship–The Example of Smart Contracts in the Insurance Market' (2021) 13 Journal of Work-Applied Management 69.
[17] Chester Cheong and Kishen (n 15).
[18] Mik (n 8).
[19] Weiqin Zou and others, 'Smart Contract Development: Challenges and Opportunities' (2021) 47(10) IEEE Transactions on Software Engineering 2084, 2106; Z Zheng and others, 'An Overview on Smart Contracts: Challenges, Advances and Platforms' (2020) 105 Future Generation Computer Systems 475, 491.
[20] Akmaral Mukhtarova and NI Lesnova, 'Smart Contracts in International Trade in Services in the Field of Intellectual Property' (2019) Proceedings of the International Scientific and Practical Conference on Digital Economy (ISCDE 2019), available on <https://doi.org/10.2991/iscde-19.2019.100> accessed 03 August 2024.
[21] Alex Norta, 'Self-Aware Smart Contracts with Legal Relevance' (2018) International Joint Conference on Neural Networks (IJCNN) 1-8. Available at doi: <10.1109/IJCNN.2018.8489235> accessed 03 August 2024.
[22] M Giancaspro, 'Is a "Smart Contract" Really a Smart Idea? Insights from a Legal Perspective' (2017) 33(6) Computer Law & Security Review 825, 835.
[23] JH Xue and R Holz, 'Applying Smart Contracts in Online Dispute Resolutions on a Large Scale and Its Regulatory Implications' in M Ragnedda and G Destefanis (eds), *Blockchain and Web 3* (2019); R Koulu, 'Blockchains and Online Dispute Resolution: Smart Contracts as an Alternative to Enforcement' (2016) 13 SCRIPTed 40.
[24] Kasatkina (n 7).

efficiencies of smart contracts while retaining the thoroughness and flexibility of conventional dispute resolution. Schmitz and Rule advocate ODR as an effective means to resolve conflicts, with potential applications in blockchain ODR start-ups[25]. Other scholars[26] further discuss the scalability and applicability of smart contract technology in ODR, highlighting its potential to autonomously resolve disputes in specific contexts, such as cross-border e-commerce[27].

These discussions underscore the ongoing effort to align the technological advances of smart contracts with traditional legal principles, ensuring that legally binding agreements remain enforceable and adaptable within the established judicial system.

2.2 The operation of smart contracts

Smart contracts embody an innovative fusion of automation and legal precision, but there is a reluctance to fully transition to code-based agreements due to the nuanced language of traditional legal documents. Research underscores the critical need to bridge computational transactions with natural language contracts for legal validity, highlighting efforts to develop machine-readable modules that mirror contractual elements and address dispute resolution[28]. Additionally, the complexity of traditional contracts necessitates a nuanced understanding of smart contracts' legal enforceability, alongside a methodical approach to formalize contract law within the digital realm[29]. These studies reflect the ongoing challenge of melding the deterministic nature of code with the interpretive flexibility of legal language, revealing a complex interplay between technological advancements and established legal frameworks.

A contract established on straightforward conditions[30] can be seamlessly translated into both machine-readable code and natural language. In contrast, translating nuanced legal concepts such as "reasonableness" or "emotional distress" into code, or designing code to

[25] Schmitz and Rule (n 7).
[26] P Ortolani, 'Chapter 21 Recognition and Enforcement of the Outcome of Blockchain-Based Dispute Resolution' in *Blockchain and Private International Law* (Brill | Nijhoff 2023); A Palombo, R Battaglini and L Cantisani, 'A Blockchain-Based Smart Dispute Resolution Method' in LA DiMatteo, A Janssen, P Ortolani, F de Elizalde, M Cannarsa and M Durovic (eds), *The Cambridge Handbook of Lawyering in the Digital Age* (Cambridge University Press 2021) 122, 139; Christoph Salger, 'Decentralized Dispute Resolution: Using Blockchain Technology and Smart Contracts in Arbitration' (2024) 24 Pepperdine Dispute Resolution Law Journal 65; Ortolani (n 10).
[27] Xue and Holz (n 23); Koulu (n 23); Aaron Wright and Primavera De Filippi, 'Decentralized Blockchain Technology and the Rise of Lex Cryptographia' [2015] SSRN <http://dx.doi.org/10.2139/ssrn.2580664> accessed 28 October 2024.
[28] Goldenfein and Leiter, 'Legal Engineering on the Blockchain: 'Smart Contracts' as Legal Conduct' (2018) 29 Law and Critique 141, 141, 149; L A DiMatteo and C Poncibó, 'Quandary of Smart Contracts and Remedies: The Role of Contract Law and Self-Help Remedies' (2018) 26 European Review of Private Law 6.
[29] Kritagya Upadhyay et al, 'Paradigm Shift from Paper Contracts to Smart Contracts' in 2021 Third IEEE International Conference on Trust, Privacy and Security in Intelligent Systems and Applications (TPS-ISA) (2021) 261, 268 <https://doi.org/10.1109/TPSISA52974.2021.00029> accessed 28 October 2024; Eric Tjong Tjin Tai, 'Formalizing Contract Law for Smart Contracts' Social Science Research Network (2017) 6 Tilburg Private Law Working Paper Series.
[30] Zheng and others (n 19); Giancaspro (n 22).

reflect complex legal principles without losing interpretative depth, poses significant challenges to the dual existence of contracts in both code and legal prose[31].

Blockchain oracles play an essential role in bridging the gap between isolated blockchain environments and the dynamic external world[32]. Oracles operate as intermediaries, enabling smart contracts to respond to external real-world events and data, beyond the limitations imposed by the blockchain. Oracles are platforms that retrieve, verify, and transfer external data to the blockchain. This allows smart contracts to operate on accurate and timely data that comes from sources outside of their enclosed ecosystems[33].

This integration of oracles addresses a fundamental challenge in the execution of smart contracts: the blockchain's inability to independently access or verify external data[34]. Oracles not only enhance the operational scope of smart contracts but also introduce a layer of trust in external sources, ensuring that the data influencing contract outcomes is reliable and impartial[35].

The reliance on oracles, however, introduces potential vulnerabilities, particularly the risk associated with external data sources. Manipulation of data by malicious actors can compromise the integrity of smart contract executions.[36] To mitigate such risks, it is crucial to employ a robust selection process for data sources, coupled with cross-referencing mechanisms, to ensure the reliability and security of the data feeding into smart contracts.

The development and execution of smart contracts intersect technological efficiency and legal complexity. While blockchain oracles significantly expand the capabilities of smart contracts by incorporating real-world data, they also underscore the importance of cautiously managing the trust placed in external data sources[37]. As smart contracts continue to evolve, the integration of blockchain oracles is instrumental in harmonising the need for external data with the inherent decentralisation of blockchain technology, paving the way for more sophisticated and legally robust automated contracts[38].

In adverse situations where the contract goes unperformed, the traditional option would be to enforce it by going to court or via arbitration. However, due to the high levels of grey areas in the execution of smart contracts, this may cause the plaintiff to incur costs and time spent in legal proceedings. It is almost impossible to code every possible

[31] Chester Cheong and Kishen (n 15).
[32] S K Ezzat, Y N Saleh, and A A Abdel-Hamid, 'Blockchain Oracles: State-of-the-Art and Research Directions' (2022) 10 IEEE Access 67551, 67572; Wang and others (n 11).
[33] ibid.
[34] ibid.
[35] F Bassan and M Rabitti, 'From Smart Legal Contracts to Contracts on Blockchain: An Empirical Investigation' (2024) 55 Computer Law & Security Review 106035.
[36] MD Sheldon, 'Auditing the Blockchain Oracle Problem' (2021) 35(1) Journal of Information Systems 121, 133.
[37] A Albizri and D Appelbaum, 'Trust but Verify: The Oracle Paradox of Blockchain Smart Contracts' (2021) 35(2) Journal of Information Systems 1, 16.
[38] Sklaroff (n 8); Mik (n 8).

"if-then" scenario into the smart contract and therefore it may not align well with real-world business settings and legal dispute resolution methods.

3 Legal position of Smart Contracts in Singapore

Singapore's contract law is primarily influenced by the English common law system[39]. This influence means that the legal principles applied by Singapore's courts often reflect those used in English common law[40]. When Singaporean cases lack direct precedents, the legal approach typically follows the English model. Unlike its neighbours, Malaysia and Brunei, Singapore chose not to codify its contract law after gaining independence in 1965, leading to a body of contract law that is mainly composed of judicial decisions.

Smart contract can be seen as an evolved form of electronic contracts[41]. These smart contracts are unique for their capacity to automatically execute and enforce terms based on predefined rules within a blockchain platform. Despite the modernity of smart contracts, traditional legal principles from common law, such as offer, acceptance, consideration, and the intention to create legal relations, still apply[42]. These principles, while not formally codified, draw heavily from English law and are essential for the legal recognition of smart contracts.

The Electronic Transactions Act[43] acknowledges electronic contracts by granting legal recognition to electronic records[44] and signatures[45], thus affirming that contracts formed electronically are as valid as their written counterparts. However, Singapore law does not specifically define "smart contracts". The term, attributed to Nick Szabo, refers to contracts that automate execution through digital means, often reducing the potential for breach and facilitating various commercial functions, from ensuring performance to managing credit.

For a smart contract to be an actual contract under Singapore law, it must fulfil all traditional contractual formation requirements[46] ie, - offer and acceptance, the intent to establish legal relations, the presence of consideration, free consent and capacity to enter

[39] AB Phang and G Yihan, *Contract Law in Singapore* (Kluwer Law International BV 2021) 32, 67; S Donohoe, 'Contractual and Statutory Liability for Building Defects in Singapore' (1999) 17(1) Structural Survey 32, 35 <https://doi.org/10.1108/02630809910258719> accessed 10 October 2024.

[40] Application of English Law Act 1993 (Singapore) available at <https://sso.agc.gov.sg/Act/AELA1993> accessed 25 July 2024; AB Phang and Yihan Goh, *Contract Law in Singapore* (Kluwer Law International BV 2012).

[41] Electronic Transactions Act *2010 (Singapore) (Act of 2010),* available at: <https://sso.agc.gov.sg/Act/ETA2010> accessed 25 July 2024.

[42] Application of English Law Act 1993 (Singapore) available at <https://sso.agc.gov.sg/Act/AELA1993> accessed 25 July 2024; Phang and Yihan Goh (n 40).

[43] Electronic Transactions Act 2010 (n 41).

[44] ibid 9.

[45] ibid 8.

[46] Application of English Law Act 1993 (n 40); Phang and Yihan Goh (n 40); Tan Cheng Han, 'Contract Formation in Singapore' in Mindy Chen-Wishart, Alexander Loke, and Stefan Vogenauer (eds), *Formation and Third Party Beneficiaries* (Oxford 2018) accessed on 25 July 2024.

a contract. Provided these criteria are met, smart contracts, in general, possess the potential for legal enforceability within the Singaporean jurisdiction.

The enforceability of each smart contract requires careful examination. As smart contracts execute entirely on code and due to their self-executing nature, they often bypass traditional legal enforcement. This does not, however, relieve them from legal oversight. Contracts rooted in illegal activities or those made under duress will likely be declared void by the courts.

Conversely, smart contracts that are written with clear and simple code, which may include provisions for resolving disputes through legal channels, generally do not face issues with enforceability. A striking consideration arises when parties explicitly state their intent not to create legal relations within the contract, this could potentially impact the contract's enforceability. In this situation, Singaporean courts may adopt an approach similar to their UK counterparts, scrutinising the broader context to ascertain the parties' genuine intent regarding legal bindingness and enforceability, despite the absence of local precedents on this matter.

In certain domains, like ship transfers, hire-purchase agreements, and real estate transactions, additional stipulations may apply. In most cases, these transactions require that the contract or the supporting documentation be duly signed and in writing. In Singapore, the capacity of entirely code-based smart contracts to satisfy these formal requirements remains an open question. For contracts predominantly in natural language, the prerequisites of writing and signature pose fewer challenges to enforcement.

When it comes to smart contracts involving cryptocurrencies, Singapore has set up a solid and forward-thinking legal structure through laws like the Securities and Futures Act 2001[47], the Payment Services Act 2019[48] and the Financial Services and Markets Act 2022[49]. These regulations aim to safeguard consumers and maintain the integrity of the market while promoting innovation. The Monetary Authority of Singapore plays a critical role in granting digital payment token licences and overseeing a regulatory environment that distinguishes between regulated and unregulated cryptocurrencies[50]. This framework ensures an organised and secure ecosystem for cryptocurrency transactions by extending beyond licensing requirements to include sales regulations, anti-money laundering, counter-terrorism financing compliance, and taxation.

The recognition of crypto assets as a form of property capable of being held on trust by the Singapore High Court in ByBit Fintech Ltd v Ho Kai Xin and others [2023][51] further strengthens the legal basis for transactions involving digital assets, aligning Singapore with other common law jurisdictions. This legal clarity around the status of cryptocurrencies

[47] Securities and futures Act 2001 (Singapore) available at <https://sso.agc.gov.sg/Act/SFA2001> accessed 20 July 2024.
[48] Payment Services Act 2019 (Singapore) available at <https://sso.agc.gov.sg//Act/PSA2019> accessed 20 July 2024.
[49] Financial Services and Markets Act 2022 (Singapore) available at <https://sso.agc.gov.sg//Act/FSMA2022> accessed on 20 July 2024.
[50] WaiWai Wong, *The Law of Smart Contracts* (Sweet & Maxwell 2022).
[51] ByBit Fintech Ltd v Ho Kai Xin and others [2023] SGHC 199.

as property is particularly significant for smart contracts, as it affirms that digital assets managed through these contracts have a recognized legal standing.

Smart contracts might also fall under the jurisdiction of applicable data protection regulations. In Singapore, the Personal Data Protection Act 2012[52] governs the collection, use and disclosure of personal data. The purpose of the Act, in Section 3, does not specifically address blockchain technology or smart contracts, nor have any directives been issued regarding this matter. Consequently, uploading an individual's unencrypted personal data to a public, permissionless blockchain network, resulting in its public disclosure, is analogous to a third party posting personal data on the internet for public access. If such an action is taken without the individual's consent or does not fall under any legal exemptions, it would represent a violation by the third party[53].

The distinctive characteristics of blockchain technology present challenges to its integration with existing data protection regulations, leading to inherent incompatibilities between the two. To address the clash between blockchain technology and data protection laws, the blockchain community[54] advocates for using private, permissioned networks for personal data management and employing off-chain transactions to prevent direct data recording on the blockchain.

3.1 Case Analysis

The first landmark case that presents the understanding of the legal standing of smart contracts and algorithmic trading within the framework of Singapore law is the decision of the Singapore Court of Appeal's in Quoine Pte Ltd v B2C2 Ltd[55]. This case scrutinises several key legal questions concerning the formation, enforceability, and potential nullification of contracts executed by automated systems without human intervention.

At the core of the dispute was whether a contract formed solely through algorithmic trading software could be considered legally binding. The Court of Appeal delineated the contractual relationships, emphasising that trading contracts were directly formed between B2C2 and the counterparties without human intervention, but through deterministic algorithms. This finding underscores the acceptance of contracts generated

[52] Personal Data Protection Act 2012 (Singapore) available at <https://sso.agc.gov.sg/Act/PDPA2012> accessed 20 July 2024.

[53] International Association for Trusted Blockchain Applications, Report on Data Protection Regulations Applicable to Blockchain Technology in Different Jurisdictions Worldwide (December 2020) <https://o.inatba.org/wp-content/uploads/2021/01/2020-12-Privacy-WG-Report-on-Data-Protection-005.pdf> accessed 20 July 2024; WaiWai Wong (n 50).

[54] J Quintais, B Bodo, A Giannopoulou, and V Ferrari, 'Blockchain and the Law: A Critical Evaluation' (2019) 2(1)Stanford Journal of Blockchain Law & Policy 86; B Arruñada, 'Blockchain's Struggle to Deliver Impersonal Exchange' (2018) 19 Minn JL Sci & Tech 55; Y Liu and others, 'An Overview of Blockchain Smart Contract Execution Mechanism' (2024) 41 Journal of Industrial Information Integration 10067; J Li and M Kassem, 'Applications of Distributed Ledger Technology (DLT) and Blockchain-Enabled Smart Contracts in Construction' (2021) 132 Automation in Construction 103955.

[55] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.

by algorithms under Singapore law, provided they operate within their programmed parameters.

The appeal raised the question of whether a contract could be voided due to a unilateral mistake, particularly when that mistake led to trades being executed at rates significantly divergent from the market price. The court clarified the application of the unilateral mistake doctrine in the context of algorithmic trading, emphasising the need to consider the programmer's knowledge and intentions at the time of programming the algorithm. The court found no unilateral mistake, either at common law or in equity, as the trades executed at the "Deep Price" were consistent with the programmed algorithm's operations, and there was no evidence to suggest that the programmer had actual or constructive knowledge of a mistake affecting the contract's fundamental terms[56].

A crucial aspect to note is how the Court of Appeal considered whether the controversial trades might be nullified because of mistakes made by one party or by both parties involved. The Court dismissed Quoine's claims that there were unilateral mistakes (as recognised by both common law and equity) and a common mistake, confirming that a valid contract was in place and that the trades occurred because the algorithms worked exactly as they were supposed to.[57] This aspect of the decision highlights the court's approach to algorithmic trading, emphasising that clarity in programming and the intentions behind algorithmic trading strategies play a crucial role in determining the validity of the contracts they create. The case underscores the legal recognition of contracts formed through automated processes, including smart contracts, in Singapore's legal system.

In another instance, Quoine's unilateral cancellation of the disputed trades, due to what it considered an aberrant execution rate caused by a technical oversight, was challenged by B2C2. The CA scrutinised the terms of the Agreement and the Risk Disclosure Statement, particularly focusing on clauses related to trade reversals and amendments to the agreement terms. The court concluded that Quoine could not unilaterally amend the agreement or cancel the trades without giving prior notice to the platform users, thereby upholding the integrity of the contractual terms as agreed upon by the parties[58].

Indeed, in analysing this case, it is noteworthy that Quoine should have established an express contractual provision that allowed for the cancellation of a smart contract under certain conditions. The presence of such a condition would have allowed for the application of a measure such as the restoration of the situation that existed before the conclusion of the smart contract.

Furthermore, the court's decision emphasises the importance of transparency and notice in contract modifications, as seen in its exploration of Quoine's unilateral actions to cancel the trades. The ruling suggests that for platforms and parties engaging in smart

[56] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02 [96] – [128].
[57] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02 [48] – [58].
[58] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.

contracts, clear communication of terms and any subsequent changes is essential to maintain the enforceability of the contracts.

On the claims of unjust enrichment and whether Quoine held the cryptocurrencies on trust for B2C2, the CA found no unjust enrichment, stating that the enrichment of B2C2 was a consequence of a valid contract[59]. Moreover, the judges concluded that there was no intention to create a trust relationship between Quoine and its users regarding the cryptocurrencies, further clarifying the legal nature of cryptocurrencies and their treatment under trust law in Singapore.

Contrary to the majority's decision, the dissenting judgement of Mance IJ offers a distinctive perspective on the application of unilateral mistake in contracts facilitated by deterministic algorithms[60]. Mance IJ proposed a broader interpretation of equitable mistake that considers the hypothetical awareness of B2C2, specifically Mr. Boonen, regarding the transactional errors, based on the circumstances at the time they transpired[61]. Mance IJ suggested that, had Mr. Boonen anticipated the transactions beforehand or been directly involved when they occurred, he would likely have recognised that the transactions were mistakenly executed. This approach by Mance IJ in adapting legal principles to accommodate the distinctive context of the case opens the door for ongoing discussions and potential evolution of legal doctrines in future cases involving similar technological complexities.

3.2 Clear position or unleashing a floodgate?

The Quoine v B2C2[62] case shines a light on key issues at the intersection of technology and legal principles, focusing on contracts created by deterministic algorithms, the responsibility tied to AI-driven decisions, the legal standing of cryptocurrencies, and the need to find the right balance between courts adapting to new realities and the need for predictable transactions.

The court’s decision in affirming algorithmically formed contracts highlights a milestone in the legal precedent as it acknowledges the transformation of digital transactions. The court’s assertion may potentially open Pandora's box when considering the implications of machine learning and AI technologies that can grow beyond their original programming. This development may present challenges to the conventional contract law concepts of intent and consent because the results can deviate significantly from the programmer's original intentions, thus putting pressure on the existing legal rules that govern automated contracts.

The difficulties in finding who is responsible for what AI systems do make legal matters even more complicated. This can be exemplified in situations where an AI chatbot learns

[59] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02 [130] – [136].
[60] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02 [152]-[203].
[61] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02 [183].
[62] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.

offensive language and spreads it to the users. In such cases, who is at fault? Is it the programmer who allowed the AI to learn it, or the users who provided the offensive words that enabled the AI to learn it? Situations like this put the traditional notions of blame and intention to the test in the digital world, making us reconsider who should be held accountable.

This case[63] also raises a discussion regarding the legal standing of digital assets by posing the question of whether cryptocurrencies should be regarded as property. The concept that cryptocurrencies might align with traditional property concepts is both innovative yet uncertain, particularly in explaining the specific nature of these digital assets. This uncertainty affects not just the applicability of trust law but also extends to taxation, inheritance, and insolvency, thereby stressing the need for a clearer legal assessment of cryptocurrencies.

The dissenting decision calls for a sophisticated response to the mistakes made by the algorithms of smart contracts to safeguard economic stability and ensure fair justice[64]. A potential misalignment between traditional legal approaches and the demands of modern technology-driven transactions can be illustrated by the hypothetical example of a hacking incident leading to mistaken transactions. This highlights the difficulty in applying age-old legal doctrines to the complexities of the digital economy.

While the case identifies these emerging challenges[65], it stops short of fully exploring avenues for legal adaptation to technological advancements. The discussion around AI hints at a critical concern but does not delve into potential legal reforms or frameworks that could effectively govern its evolving capabilities.

There seems to be a hinted tension between the judicial ability to adapt and the need for businesses to have certainty, possibly overlooking how legal principles can evolve to both embrace technological advancements and provide stable outcomes for businesses. To achieve a balance between innovation and predictability, future developments could consider hybrid approaches that incorporate technology-specific regulations or specialised dispute resolution mechanisms.

4 Legal position of smart contract Malaysia

Malaysia operates under a dual legal system that incorporates both common law principles and Sharia law. The primary legislation governing contracts is the Contracts Act 1950[66], which is rooted in English common law. The Act does not require contracts to be in a specific format, thereby implicitly recognizing the legality of contracts made through digital platforms, including smart contracts. The technological neutrality stance suggests

[63] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.
[64] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.
[65] Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.
[66] Contracts Act 1950 [Act 136] (Malaysia) available at <https://lom.agc.gov.my/ilims/upload/portal/akta/LOM/EN/Act%20136.pdf> accessed 25 July 2024.

that smart contracts could be considered legally binding if they meet the essential requirements outlined by Malaysian law: offer[67], acceptance[68], consideration[69], intention to establish legal relations, capacity to contract[70] and free consent[71].

Although the Act primarily addresses traditional contracts, the legitimacy and legal status of a smart contract depend on meeting these basic criteria outlined in the Act[72]. Compared to traditional contracts, smart contracts streamline the process of securing and documenting transactions from start to finish. The use of blockchain technology also guarantees that contract data is stored across a decentralised network, making it difficult to challenge the contract's validity after it has been executed[73]. Smart contracts stand out from traditional contracts in two main ways: how transactions are recorded and the use of automated ledgers[74].

Parties can automatically register a smart contract on the blockchain's distributed ledger by agreeing upon its conditions and adding their digital[75] or electronic signatures[76]. After the contract's execution, the computer program autonomously updates the next action, as regulated by the network's overseers. The ultimate disposition of a blockchain smart contract, particularly those devised by a specific entity, remains under their definitive supervision and control[77]. Smart contracts, being self-executing contracts, operate on an automated basis. Their supervision and control are achieved through embedded rules, blockchain transparency, immutability, and third-party verification[78]. While these features provide a high degree of automation and security, the ultimate control lies with the entity that deploys the smart contract. They design, deploy, and may potentially update the contract, ensuring that it aligns with their intended objectives. Blockchain's attribute of confidentiality governs the management and disclosure of contract particulars among the involved parties. Typically, the considerations within a

[67] ibid 2 (a).
[68] ibid 2 (b).
[69] ibid 2 (d).
[70] ibid 11.
[71] ibid 10.
[72] Wong (n 50).
[73] SM Nzuva, 'Smart Contracts Implementation, Applications, Benefits, and Limitations' (2019) 9(5) Journal of Information Engineering and Applications 63.
[74] Li and Kassem (n 54).
[75] Digital Signature Act 1997 [Act 562] (Malaysia) s. 62; Digital Signature Regulations 1998 [P.U.(A) 359/98] (Malaysia), available at <https://lom.agc.gov.my/ilims/upload/portal/akta/LOM/EN/Act%20562.pdf> accessed 25 July 2024.
[76] Electronic Commerce Act 2006 [Act 658] (Malaysia), s.9, available at <https://aseanconsumer.org/file/post_image/Act%20658%20-%20Electronic%20Commerce%20Act%202006.pdf> accessed 25 July 2024.
[77] C D Clack, V A Bakshi, and L Braine, 'Smart Contract Templates: Foundations, Design Landscape and Research Directions' [2016] arXiv:1608.00771 [preprint].
[78] D Maesa, P Mori, and L Ricci, 'A Blockchain Based Approach for the Definition of Auditable Access Control Systems' (2019) 84 Computer Security 93.

smart contract may encompass digital (or on-chain) assets and physical (or off-chain) assets[79].

Digital assets, especially cryptocurrencies, offer a frictionless and rapid means of executing payment transactions directly from users' cryptocurrency wallets or accounts, epitomising the convenience of instant payment systems. This stands in contrast to the handling of physical assets, which involves the exchange of stocks, currency, gold, or other valuables, with each transaction meticulously recorded on the blockchain's distributed ledger. The adoption of this technology into legal agreements signifies a remarkable transformation in legal practices, presenting both challenges and opportunities for recognizing and implementing smart contracts within established legal paradigms[80]. The regulatory framework for digital assets in Malaysia is currently shaped by the Capital Markets and Services (Prescription of Securities) (Digital Currency and Digital Token) Order 2019[81]. This regulation serves to define "digital currency" and "digital tokens," collectively referred to as "digital assets," as securities under the securities laws of Malaysia, thereby broadening the scope of "securities" under the Capital Markets and Services Act 2007[82] (CMSA) and bringing its oversight under the jurisdiction of the Securities Commission Malaysia (SC).

In response to this regulation, the SC revised the “Guidelines on Digital Assets”[83] and “Guidelines on Recognised Markets"[84] to specify the requirements and regulatory framework for digital asset platform operators on the Digital Asset Exchange. DAX is an online platform that facilitates the trading of digital assets. Per these guidelines, operators of the DAX must obtain registration as Recognised Market Operators under Section 34 of the CMSA and comply with the specified guidelines.

The crucial provisions that could be relevant to smart contracts within the Contract Acts 1950[85] are *amongst others:*

[79] A Deshpande, K Stewart, L Lepetit and S Gunashekar, Distributed Ledger Technologies/Blockchain: Challenges, Opportunities and the Prospects for Standards. Overview Report (The British Standards Institution (BSI) 2017) 40(40) 1-34.

[80] AJ McNamara and SM Sepasgozar, 'Intelligent Contract Adoption in the Construction Industry: Concept Development' (2021) 122 Automation in Construction 103452.

[81] Capital markets and services (Prescription of services) (digital services and digital token) Order 2019 [P.U (A) 12/2019] (Malaysia) available at <https://www.sc.com.my/api/documentms/download.ashx?id=8c8bc467-c750-466e-9a86-98c12fec4a77> accessed on 25 July 2024.

[82] Capital markets and services Act 2007 [Act 671] (Malaysia) available at <https://www.sc.com.my/api/documentms/download.ashx?id=70b43137-9a48-4540-b955-f1114ceb3445> accessed on 25 July 2024.

[83] Securities Commission, Guidelines on Digital Assets SC-GL/1-2020 (R2-2024) (Malaysia) available at <https://www.sc.com.my/api/documentms/download.ashx?id=e63db44c-b6d8-4ae9-adf1-afdf9b548d54> accessed on 25 July 2024.

[84] Securities Commission, Guidelines on Recognized Markets SC-GL/6-2015(R11-2024) (2024) (Malaysia) available at <https://www.sc.com.my/api/documentms/download.ashx?id=a36e1d80-9afd-4913-8dd8-51c889a60fec> accessed on 25 July 2024.

[85] Contracts Act 1950 (n 66).

- Section 10 (1) emphasises that all agreements constitute contracts if made by freely consenting parties competent to contract, for a lawful consideration and object, and not expressly declared void.
- Section 2 (a) defines a proposal as the expression of willingness by one party to do or refrain from doing something to gain the other's assent.
- Section 5(1) allows for revocation at any time before the acceptance communication is complete.
- Section 2(b) describes acceptance as a final and unconditional agreement to the offer's terms.
- Section 2 (d) explains that any act, abstinence, or promise by the promisee or another person at the promisor's desire constitutes consideration for the promise.

As previously mentioned, the integration of smart contracts into the Malaysian legal system is being shaped by the Contracts Act 1950[86]. However, the potential application of smart contracts in Islamic banking and financing introduces a unique blend of legal traditions, as it implies the application of Shariah principles. This interplay presents distinct challenges and opportunities for recognizing and enforcing smart contracts within the established legal framework.

While both common law and Shariah law influence Islamic banking, they operate within distinct frameworks. Common law governs the procedural aspects of disputes, while Shariah law ensures that financial contracts comply with Islamic principles[87]. Islamic banking disputes remain under the jurisdiction of civil courts due to the need to apply federal laws like the Contracts Act.

Civil courts may face challenges when Shariah non-compliance is raised, as not all judges are experts in Islamic finance. Therefore, special references to the Shariah Advisory Council are sometimes required for interpreting Shariah-related matters[88].

Scholars have observed that smart contracts, powered by blockchain technology, align well with the traditional paradigms of contract law[89]. This observation requires a strict

[86] ibid.

[87] A Trakic, 'The Adjudication of Shari'ah Issues in Islamic Financial Contracts: Is Malaysian Islamic Finance Litigation a Solution?' (2013) 29(4) Humanomics 260, 275.

[88] H Hasshan, 'Islamic finance litigation: Problems within the Malaysian civil courts structure' (2016) 20(1) Jurnal Undang-Undang dan Masyarakat 33, 39; S Miskam, NAM Puad, & NJ Rafdi, 'Reference to the Shari 'ah Advisory Council in Islamic Finance: Preliminary Analysis on Civil Court Decisions', in *Proceedings of the Social Sciences Research* (2014) *ICSSR*, 9-10; Bank Negara Malaysia, Manual Rujukan Mahkamah dan Penimbangtara kepada Majlis Penasihat Shari'ah (Bank Negara Malaysia 2015) available at <http://www.bnm.gov.my/?ch=7&pg=1038&ac=419&bb-file1> accessed 14 June 2015.

[89] NRBM Zain, ERAE Ali, A Abideen, and HA Rahman, 'Smart Contract in Blockchain: An Exploration of Legal Framework in Malaysia' (2019) 27(2) Intellectual Discourse 595, 617; N Ismail, Z Ismail, O Musa, and C Loy, 'Malaysia Zakat Smart Contract Architectural Framework Design' (2023) 13(5) International Journal of Academic Research in Business and Social Sciences; DN Bolhassan and others, 'Towards Adoption of Smart Contract in Construction Industry in Malaysia' (2022) 30(1) Pertanika Journal of Science & Technology; A Aborujilah, MNBM Yatim, and A Al-Othmani, 'Blockchain-Based Adoption Framework for Authentic Land Registry System in Malaysia' (2021) 19(6) TELKOMNIKA (Telecommunication Computing Electronics and Control) 2038-2049; KJ Yong, ES Tay, and DW Khong (n 14).

adherence to the requirements prescribed in the Contracts Act 1950[90]. Although the regulator has made some progress in updating its policies regarding digital assets and navigating the new technological landscapes introduced by blockchain, there is a significant push for broadening the legal definition of electronic transactions to comprehensively include the activities facilitated by smart contracts and blockchain technology.

In Malaysia, the Personal Data Protection Act 2010[91] is the cornerstone of data protection legislation, setting out the obligations for data users and granting rights to data subjects regarding their personal data. Additionally, it outlines seven principles for processing personal data[92]. Although the Act doesn't specifically mention blockchain technologies and smart contracts, its provisions may conflict with blockchain's fundamental traits. The retention principle[93], which mandates the deletion of personal data when no longer needed, contradicts blockchain's core feature of permanently recording transactions on decentralised ledgers. This requirement challenges the feasibility of aligning blockchain's immutable record-keeping with conventional data protection norms.

Section 12 of the Act[94] allows individuals to access and correct their personal data, but this right clashes with the immutable nature of blockchain technology, where changes require network consensus. To reconcile this, the blockchain community proposes using permissioned blockchains for better control and conducting off-chain transactions to isolate data, aligning with data protection laws while preserving blockchain's essential characteristics[95].

Although smart contracts are theoretically compatible with Contracts Act 1950[96] and other regulations related to them, their unique features, such as the ability to execute transactions automatically, bring up important issues about their enforceability, especially when disputes arise. The conventional mechanisms of dispute resolution and contract enforcement within the Malaysian jurisdiction are built on judicial intervention, a paradigm potentially at odds with the inherently autonomous nature of smart contracts. Therefore, while it's possible to recognize smart contracts within existing legal frameworks in theory, there are real challenges to their practical enforceability and the resolution of conflicts.

[90] Contracts Act 1950 (n 66).
[91] Personal Data Protection Act 2010, [Act 709] (Malaysia) available at <https://mia.org.my/wp-content/uploads/2022/05/Personal.Data_.Protection.Act_.2010.pdf> accessed on 25 July 2024.
[92] ibid 5.
[93] ibid 10.
[94] ibid 12.
[95] International Association for Trusted Blockchain Applications, Report on Data Protection Regulations Applicable to Blockchain Technology in Different Jurisdictions Worldwide (December 2020) <https://o.inatba.org/wp-content/uploads/2021/01/2020-12-Privacy-WG-Report-on-Data-Protection-005.pdf> accessed 10 October 2024; Wong (n 50).
[96] Contracts Act 1950 (n 66).

4.1 Case analysis

The case of Robert Ong Thien Cheng v Luno Pte Ltd & Anor[97] cements a pivotal position on the legality and enforceability of smart contracts.

During the cryptocurrency surge of 2017, a conflict emerged between Luno Pte Ltd, a renowned digital currency exchange in Malaysia, and one of its customers, Robert Ong Thien Cheng[98]. Robert, the appellant, deposited a sum of RM300,000 into Luno's account, which was converted into 11.3 BTC and transferred to his Bitfinex account. Due to a system error, an additional 11.3 BTC was mistakenly sent to Robert. Robert acknowledged the mistake but did not return the additional bitcoins. Instead, he used the bitcoins for trading activities, which resulted in a loss, and later proposed to repay RM300,000. This amount was considered insufficient because of the volatility in Bitcoin's price. Consequently, Luno initiated legal action to recover the 11.3 BTC or its equivalent market value, prompting a legal review based on Section 73 of the Contracts Act 1950, which deals with the recovery of mistakenly received property[99].

The legal action initiated by the Appellant under Section 73 of the Contracts Act 1950[100], which mandates the restitution of money or property received by mistake or coercion, brought to light the legal quandary of categorising Bitcoins. The Appellant argued against the classification of Bitcoins as a 'thing' returnable in the context of Section 73 of the Contracts Act 1950.

The High Court's decision underscored the imperative for the Contracts Act 1950 to evolve in tandem with advancements in technology and commercial practices. The court held amongst others that:-

> *"[15] The Respondents were also correct that it cannot be disputed that it is a form of 'commodity' as real money is used to purchase the cryptocurrency. In this regard, there is indeed value attached to the Bitcoin in the same way as value is attached to 'shares'.*
>
> *[16] I also agree with the view that the Contracts Act, 1950 having been drafted some 7 decades ago ought to be construed to reflect changes in modern technology and commerce.*
>
> *[17] Hence, rightfully Bitcoins ought to fall under the ambit and application of the term 'anything' under Section 73 of the Contract Act 1950 and therefore, the Appellant is bound to return the same to the Respondents if the circumstances*

[97] Robert Ong Thien Cheng v Luno Pte Ltd & Anor [2020] 3 AMR 143.
[98] Robert Ong Thien Cheng v Luno Pte Ltd & Anor [2020] 3 AMR 143; Tan Zu Hao, 'Malaysia: Crypto Law In Malaysia' (Mondaq, 7 November 2022) <https://www.mondaq.com/fin-tech/1248146/crypto-law-in-malaysia> accessed 10 February 2024.
[99] Robert Ong Thien Cheng v Luno Pte Ltd & Anor [2020] 3 AMR 143; Tan Zu Hao, 'Malaysia: Crypto Law In Malaysia' (Mondaq, 7 November 2022) <https://www.mondaq.com/fin-tech/1248146/crypto-law-in-malaysia> accessed 10 February 2024.
[100] Contracts Act 1950 (n 66).

warrant it. In this regard, the term 'anything' is plainly wide enough to cover Bitcoins"[101].

The High Court acknowledged the Respondents' assertion that, although cryptocurrency does not constitute 'money' or legal tender in the conventional sense, it has been classified as a form of 'security' by the Capital Markets and Services (Prescription of Securities) (Digital Currency and Digital Token) Order 2019[102]. The Court also observed that cryptocurrency acts as a "commodity" because it is bought with real money and carries intrinsic value, similar to shares.[103] It further acknowledged that the legal framework, which was put in place seven decades ago, needs to be applied in a way that takes into account the advances in technology and changes in the commercial environment of today. As a result, the Court ruled that Bitcoin fall under the definition of 'anything' as specified in Section 73 of the Contracts Act 1950[104], making it obligatory for the Appellant to return the Bitcoin under appropriate circumstances.

The court judgment demonstrates the readiness of the judiciary to adapt established legal norms to align with the changing landscapes of contemporary technology and business practices. Additionally, the recognition from the judiciary further cements the legal standing of cryptocurrencies within the legal framework, highlighting the judiciary's responsiveness to the current evolving state of law and technology.

5 The Diverse Applications of Smart Contracts Across Industries

The exploration of smart contracts, highlighted by scholars and legal experts in Singapore and Malaysia, focuses on streamlining contractual processes across various domains, including landlord-tenant agreements[105], banking and fintech[106], retail, manufacturing, healthcare[107] and construction contracts. This represents a significant intersection between technological advancements and the legal framework of the nation.

A study conducted on the potential use of smart contracts in tenancy agreements emphasises how blockchain technology seeks to improve the efficiency, transparency, and security of transactions[108]. However, the authors also highlight that the integration of such

[101] Robert Ong Thien Cheng v Luno Pte Ltd & Anor [2020] 3 AMR 143.
[102] Capital markets Act (n 81).
[103] Robert Ong Thien Cheng v Luno Pte Ltd & Anor [2020] 3 AMR 143.
[104] Contracts Act 1950 (n 66).
[105] Yong, Tay and Khong (n 14).
[106] V Nienhaus, 'Blockchain Technologies and the Prospects of Smart Contracts in Islamic Finance' in *Fintech in Islamic Finance* (Routledge 2019) 183, 210; M F Roslan, O Bamahriz, A Muneeza, J Chu, Z Mustapha, and M Z Ahmad, 'Application of Tawarruq in Islamic Banking in Malaysia: Towards Smart Tawarruq' (2020) 7(2) International Journal of Management and Applied Research 104, 119; O Chowdhury, M A S A Rishat, M H B Azam and MA Amin, 'The Rise of Blockchain Technology in Shariah Based Banking System' in Proceedings of the 2nd International Conference on Computing Advancements (March 2022) 349, 358.
[107] Muhammad Izdihar Sahalan, Fathi Yusof, and Hafiza Abas, 'The Challenges of Using Blockchain Technology for Medical Data in Public Hospitals in Malaysia' (2023) 11(2) Open International Journal of Informatics 90, 105.
[108] Yong, Tay and Khong (n 14).

technologies introduces complex legal considerations regarding their validity, adherence to regulatory standards, and implications for established legal procedures. Smart tenancies leverage blockchain's architecture to automate contractual obligations, demanding conformity with principal legislation in Malaysia such as the Stamp Act 1949[109] and the Electronic Commerce Act 2006[110], ensuring that smart tenancy contracts are legally recognised. Despite the automation, the necessity for conventional dispute resolution frameworks remains, given the legal system's safeguards against self-execution of eviction, thus protecting tenants' rights amidst technological advancements.

Scholars have pointed out that Malaysian regulators are urged to view smart tenancy solutions as instruments for enhancing tenancy management efficiency rather than as disruptive innovations[111]. This highlights the need for a review to clarify the legal status of smart tenancies, promoting innovation while ensuring robust legal and consumer protections.

Smart contracts have revolutionised Islamic finance in the banking sector[112]. The contracts allow the automation of Murabaha transactions, a foundation of Islamic banking, ensuring compliance with Shariah principles. Smart contracts guarantee transactional integrity via immutable public ledger recordings, preserve anonymity, and preclude disputes by strictly adhering to contract conditions[113]. This approach reduces uncertainties, minimises the risks of default, simplifies financial processes[114], cuts operational expenses, and removes the need for paper-based documentation, thereby bolstering the efficiency and dependability of financial services[115].

Moreover, integrating Sharia governance into smart contracts introduces a layer of compliance, which is crucial for Islamic finance institutions. Once regulators like Bank Negara Malaysia are integrated into the blockchain, transactions can be validated for Sharia compliance in real time[116]. If non-compliant transactions are detected, they will be automatically rejected[117].

This innovation aligns seamlessly with the ethical principles of Islamic finance, while also enhancing financial transparency and ensuring strict adherence to regulatory standards[118].

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[109] *STAMP ACT* 1949 [Act 378] (Malaysia) available at <https://phl.hasil.gov.my/pdf/pdfam/Stamp_Act_1949_as_at_01072014.pdf> accessed on 20 July 2024.
[110] Electronic Commerce Act 2006 [Act 658] (Malaysia), available at <https://aseanconsumer.org/file/post_image/Act%20658%20-%20Electronic%20Commerce%20Act%202006.pdf> accessed 25 July 2024.
[111] Yong, Tay and Khong (n 14).
[112] Nienhaus (n 106).
[113] ibid.
[114] Roslan, Bamahriz, Muneeza, Chu, Mustapha, and Ahmad (n 106).
[115] Nienhaus (n 106).
[116] Roslan, Bamahriz, Muneeza, Chu, Mustapha, and Ahmad (n 106).
[117] ibid.
[118] ibid.

This technological advancement also extends to the realm of Islamic finance management, notably in the context of zakat[119]. The application of smart contracts to zakat highlights how easily technology can integrate with religious obligations, demonstrating the flexibility and wide range of uses for blockchain technology. By automating zakat collection and distribution, blockchain enhances the efficiency, transparency, and security of these transactions. It ensures that zakat reaches the correct beneficiaries, thereby reducing the risk of mismanagement or corruption[120]. Compliance with Islamic law and honouring the religious significance of zakat are crucial in this process. With blockchain's immutability offering transparent and accountable transactions, the deployment of smart contracts for zakat management aims to bolster public trust in zakat institutions, demonstrating the profound impact of technology on fulfilling religious obligations[121].

The application of smart contracts in Islamic finance operates within Malaysia's dual legal framework[122], which uniquely combines common law and Islamic law. In cases of disputes arising from Islamic banking contracts, the principles of contract law, derived from common law, remain applicable. However, their interpretation and application must be harmonised with Islamic principles, underscoring the importance of both legal systems in shaping Malaysia's legal landscape. This dual legal framework not only ensures that Islamic financial products comply with Shariah principles but also integrates them into the broader legal system, providing a comprehensive approach to resolving disputes and enforcing contracts.

In the construction industry, the potential adoption of smart contracts could offer substantial advantages such as automation and efficiency, improved risk apportionment, enhanced transparency, and trust, alongside payment security and cash flow improvements[123]. Automation simplifies contract management, minimises time consumption, and effectively resolves conflicts and disputes. The self-executing nature of smart contracts ensures a clear distribution of risks and responsibilities without manual intervention or intermediaries. Digitising contracts within blockchain technology provides all parties with equal access to information, reducing misunderstandings and fostering a transparent environment[124]. Additionally, smart contracts automate payments upon

[119] ibid.
[120] Ismail, Ismail, Musa, and Loy (n 89).
[121] ibid.
[122] Hasshan (n 88); Miskam, Puad, & Rafdi (n 88); Bank Negara Malaysia (2015). Manual Rujukan Mahkamah dan Penimbangtara kepada Majlis Penasihat Shari'ah Bank Negara Malaysia, accessed 14 June 2015, <http://www.bnm.gov.my/?ch=7&pg=1038&ac=419&bb-file1> accessed 1 November 2024.
[123] Bolhassan and others (n 89).
[124] A Abdelghany, 'Navigating the Complexity of Construction Contracts and the Value of Blockchain Technology: A Systems Dynamics Perspective - Review Paper' (2024) 3(1) International Journal of Automation and Digital Transformation 44, 64.

meeting predefined conditions, addressing the industry's challenge of delayed payments and positively impacting cash flow[125].

However, the widespread adoption of smart contracts in the construction sector, as well as other industries, faces challenges such as legal and regulatory uncertainties, technical and infrastructure challenges, and the volatility associated with cryptocurrency transactions[126]. These challenges highlight the need for legal clarifications, technological infrastructure investments, and broader acceptance of digital currencies to fully leverage the benefits of smart contracts.

Similar to the discussion on smart tenancies and the deployment of smart contracts for zakat management, the application of smart contracts in the construction sector and other industries raises legal and regulatory considerations. It requires a thorough review of existing laws and may necessitate regulatory amendments, or the introduction of new guidelines tailored to the use of blockchain technology in various sectors.

Together, these explorations into smart tenancies, zakat management, and the construction sector via smart contracts signify the transformative potential of smart contracts. They highlight the need for a collaborative effort among technology developers, legal professionals, regulatory bodies, and industry stakeholders. This collective approach aims to harmonise technological innovations with the legal and regulatory frameworks in Singapore and Malaysia, ensuring that the benefits of smart contracts are maximised while safeguarding the interests of all stakeholders involved.

6 The adaptability

The inherent adaptability within the legal systems of Malaysia and Singapore, deeply rooted in their common law heritage, is particularly evident in their handling of smart contracts amidst the rapidly evolving landscape of digital innovation. This adaptability is supported by the technology-neutral orientation of the Malaysian Contracts Act 1950[127], and equally, by the flexible nature of Singaporean Contract Law, which allows for the execution of contracts in diverse formats without strict legal mandates. Such legislative openness, paired with the common law tradition's focus on judicial interpretation and the principle of precedent, facilitates the smooth incorporation of technological advancement[128], particularly digital agreements, including those executed on blockchain platforms. The capacity for case law to evolve in response to technological advances, sidestepping the lengthy processes often linked to legislative change, showcases the

[125] Katharina Sigalov, Xuling Ye, Markus König, Philipp Hagedorn, Florian Blum, Benedikt Severin, Michael Hettmer, Philipp Hückinghaus, Jens Wölkerling and Dominik Groß, 'Automated Payment and Contract Management in the Construction Industry by Integrating Building Information Modeling and Blockchain-Based Smart Contracts' (2021) 11(16) Applied Sciences 7653.
[126] Bolhassan and others (n 89).
[127] Act 136, Contracts Act 1950 Act 136 (Malaysia) (n 66).
[128] LB Moses, 'Adapting the Law to Technological Change: A Comparison of Common Law and Legislation' (2003) 26(2) The University of New South Wales Law Journal 394-417.

adeptness of both the Malaysian and Singaporean legal frameworks in navigating the swift shifts that define the modern digital era.

The judiciary's role in adapting its interpretations in line with new technological advancements further highlights its flexibility. Through landmark case law[129], courts have demonstrated their readiness to extend traditional legal doctrines to cover digital transactions and assets as well as to set a precedent for the legal standing of contracts created by automated systems, such as smart contracts. This willingness to apply well-established legal principles—such as those found in the Electronic Transactions Act (ETA)[130] and Singapore's principles of contract law—in modern times without the need for new legislation demonstrates the common law system's effectiveness. It guarantees that the legal system will continue to be flexible and capable of handling the complexities brought about by digital innovations.

Both legal systems have shown progressive stances in acknowledging digital assets. In Malaysia, cryptocurrencies are explicitly recognised as a form of "security," integrating digital currencies into the legal and regulatory framework of the financial market[131].

The recognition and acknowledgment of contracts generated by algorithms and of digital assets are crucial for the enforcement and adjudication of smart contracts involving digital assets, offering a degree of legal clarity and stability amidst the fast-paced evolution of digital transactions.

The flexibility of the common law system is one of its advantages but given the speed at which technology is developing and the unique qualities of digital contracts, further guidance from the regulatory body would be helpful. Proactive legislative steps will strengthen the legal framework's resilience in adapting to the ever-changing nature of digital transactions while also assisting the judicial system in rendering well-informed verdicts. This strategy would improve Malaysia's standing as a jurisdiction that both upholds legal traditions and welcomes technological advancement by ensuring a more consistent and predictable legal environment for the growth of digital commerce.

This approach aims to ensure a more cohesive and predictable legal environment for digital commerce's expansion, enhancing Malaysia and Singapore's positions as countries that preserve legal traditions while embracing technological advancements.

7 Technological Neutrality versus Operational Specificity

Although contracts carried out on digital platforms, such as smart contracts, are supposedly covered by the Act's inherent technological neutrality, applying it to these modern contractual forms is more complex. The essence of smart contracts—predominantly characterised by their automation and reliance on blockchain technology—

[129] Robert Ong Thien Cheng v Luno Pte Ltd & Anor [2020] 3 AMR 143; Quoine Pte Ltd v B2C2 Ltd [2020] SGCA(I) 02.
[130] Electronic transaction Act 2010 (Singapore) (n 41).
[131] Capital markets Act (n 81).

introduces a paradigm shift in how transactions are executed and recorded, diverging significantly from traditional contract law's manual and judicially supervised processes.

The integration of smart contracts within the framework established in the Contracts Act 1950 in Malaysian law poses several intricate issues that require a thorough assessment of potential legislative and procedural adjustments. This change calls for an examination of how the technological neutrality of the Act, while beneficial for accommodating the formative stages of digital contracts, may fall short in addressing the complex realities of blockchain technology and smart contract execution. Although the contract law in both Malaysia and Singapore can accommodate smart contracts, certain complexities require clarity in specific contexts, especially regarding the unique attributes of smart contracts—automation, blockchain dependency, and self-executing mechanisms. These attributes deviate from the traditional approach to contract execution and enforcement, potentially leading to differing judicial interpretations in both jurisdictions.

A supporting example can be drawn from the UK's Law Commission[132], which similarly recognised that while existing legal frameworks are robust enough to accommodate smart contracts, further clarification is needed to ensure legal certainty. The UK Law Commission concluded that the current legal framework is sufficiently robust to support smart legal contracts, with only incremental developments needed to adapt to specific contexts. The challenges posed by smart contracts are not fundamentally different from those of traditional contracts. While some novel legal issues may arise, such as the interpretation of coded terms, the flexibility of English common law allows it to accommodate these challenges without necessitating a separate legal regime.

This example from the UK suggests that contract law in Singapore and Malaysia can similarly support smart contracts, but it underscores the need for clearer legal guidance to ensure that emerging issues are adequately addressed. The UKJT Legal Statement[133] further highlights that minor, focused reforms, rather than the creation of a new legal regime, can provide the necessary legal infrastructure to foster confidence in smart contracts. By drawing on these lessons, Malaysia and Singapore could issue legal statements or guidelines to harmonise the interpretation and enforcement of smart contracts within their own jurisdictions. Such proactive measures would not only enhance legal certainty but would also support the broader adoption of smart contracts in these jurisdictions, ensuring that both Malaysia and Singapore remain at the forefront of legal adaptability and technological advancement in their common law systems.

[132] Law Commission, Smart legal contracts, advice to government, CP563 (2021) at <https://s3-eu-west-2.amazonaws.com/cloud-platform-e218f50a4812967ba1215eaecede923f/uploads/sites/30/2021/11/Smart-legal-contracts-accessible.pdf> accessed 21 October 2024.

[133] UK Jurisdiction Taskforce, Legal statement on cryptoassets and smart contracts (2019) ("UKJT Legal Statement"), <https://35z8e83m1ih83drye280o9d1-wpengine.netdna-ssl.com/wp-content/uploads/2019/11/6.6056_JO_Cryptocurrencies_Statement_FINAL_WEB_111119-1.pdf> accessed 21 October 2024.

Although there are two landmark cases in both countries, the case from the Court of Appeal in Singapore provides a strong binding precedent, whereas one of the landmark cases from the High Court in Malaysia does not yet have the same level of influence. While some degree of stare decisis and legal certainty exists, future cases may deviate from the current understanding until the Federal Court of Malaysia establishes its position. A misinterpretation in future case law could complicate and destabilize the status of smart contracts. Therefore, as courts grapple with the challenge of interpreting smart contracts within the framework of established legal doctrines, the introduction of explicit statutory guidance could enhance certainty. For instance, the UKJT Digital Dispute Resolution Rules[134], chaired by Sir Geoffrey Vos, offers a framework specifically designed to resolve disputes arising from smart contracts, digital assets, and distributed ledger technology. These rules emphasise rapid arbitration, on-chain resolution with private keys, and tailored procedures for digital assets—key innovations that could serve as instructive examples for Malaysia and Singapore. By adopting similar mechanisms, such as expert-led determinations and the possibility of direct on-chain execution of decisions, Malaysia and Singapore could ensure that their legal systems are responsive to the technological demands of automated contracts and digital assets.

Moreover, the UKJT's focus on ensuring that disputes are resolved by individuals with both legal and technical expertise is critical in a landscape where smart contracts and digital assets are highly technical. This could help minimise judicial inconsistencies and foster more informed interpretations in Malaysia and Singapore. Additionally, the provision for party anonymity and rapid dispute resolution, with clear enforcement mechanisms, could be beneficial for cross-border transactions involving decentralised technologies, which frequently span multiple jurisdictions. The adoption of similar guidelines could reduce legal uncertainty, promote consistency in judicial interpretation, and further strengthen Malaysia and Singapore's positions as favourable jurisdictions for handling disputes involving novel digital technologies This situation, exemplified by the findings on smart tenancies[135], illustrates a tangible example of the complexities involved. The study highlights the reluctance of tenants to adopt cryptocurrency payment methods due to the necessity of upfront payments and the volatility of cryptocurrencies, which complicates the conversion to fiat currency for periodic rent payments. These practical difficulties, alongside concerns about the acceptance of cryptocurrency as a payment method and its legal status as tender, underscore the broader issue of technological adaptability within legal practices. The Act's technological neutrality, while intended to be inclusive, may instead lead to a legal landscape characterised by divergent outcomes and varied judicial interpretations. This variability risks creating a legal environment of

[134] UK Jurisdiction Taskforce, Digital Dispute Resolution Rules (2021) <https://35z8e83m1ih83drye280o9d1-wpengine.netdna-ssl.com/wp- content/uploads/2021/04/Lawtech_DDRR_Final.pdf> accessed 10 October 2024.
[135] Yong, Tay and Khong (n 14).

inconsistencies, posing a significant challenge to the legal certainty and predictability that are crucial for the growth of the digital economy.

This potential for legal fragmentation underscores the imperative for a nuanced strategic approach that transcends mere accommodation of technology to actively sculpting the legal landscape to address the intricacies of smart contracts. By instituting explicit legal guidelines that cater to the distinctiveness of smart contracts—clarifying their legal status, operational boundaries, and the framework for dispute resolution—the legislature can significantly reduce the ambiguity that currently permits wide judicial discretion[136]. Following steps like those taken in the UK[137] could be highly beneficial. In the UK, non-binding statements and guidelines have been issued to clarify the legal issues of smart contracts and digital assets.

Building on the proactive strategies seen in the UK, Australia offers an added perspective by demonstrating how existing legal frameworks can effectively accommodate smart contracts without the need for new legislation[138]. Smart contracts are considered enforceable as they meet essential contract criteria—agreement, consideration, and intent. The Electronic Transactions Act 1999[139] further supports their validity as electronic transactions, while the Australian Consumer Law[140] extends protections, such as unfair contract term provisions, to smart contracts, ensuring fairness and transparency comparable to traditional contracts. Australia emphasizes clarity in coded terms, encouraging businesses to provide plain language explanations to make smart contracts accessible to consumers, thereby addressing potential imbalances in technical literacy[141]. Regulatory bodies, notably the Australian Competition and Consumer Commission, actively monitor smart contracts for unfair practices. Australia has also taken steps to integrate smart contracts within its legal system, with initiatives such as the Australian National Blockchain[142] aiming to provide a platform for legally enforceable smart contracts.

These examples illustrate how common law jurisdictions can evolve their legal systems to accommodate technological advancements effectively. This shall not be taken as a proposal to introduce new legislation but merely a guideline. Such guidelines could clarify the legal status, operational boundaries, and dispute resolution mechanisms of smart contracts, providing a framework that guides judicial interpretation without restricting

[136] Zain, Ali, Abideen, and Rahman (n 89).
[137] UK Jurisdiction Taskforce, Legal statement on cryptoassets and smart contracts (n 133).
[138] ST Nguyen, 'Consumer Protection Against Unfair Contract Terms in the Age of Smart Contracts' (2023) 51(4) Federal Law Review 487.
[139] Electronic Transactions Act 1999 Act No 162 of 1999 (Australia) <https://www.legislation.gov.au/C2004A00553/latest/text> accessed 10 October 2024.
[140] Competition and Consumer Act 2010 No 51 of 1974 (Australia) <https://www.legislation.gov.au/C2004A00109/latest/text> accessed 10 October 2024.
[141] ST Nguyen (n 138); Matthew McMillan et al, 'Australia: Smart(er) Contracts in 2020' Mondaq (Web Page, 9 August 2020) <https://www.mondaq.com/australia/new-technology/974460/smarter-contracts-in-2020> accessed 25 October 2024.
[142] Australia developing national blockchain for legal contracts at <https://www.ledgerinsights.com/australian-national-blockchain-smart-legal-contracts/> accessed 25 October 2024.

the existing legislative framework. This targeted action would serve to guide judicial interpretation without restricting the Act, channelling it within a framework that reflects the technological specificities and societal implications of smart contracts.

Moreover, beyond legislative reform, there is a pressing need for a comprehensive strategy that includes judicial education and the development of jurisprudential guidelines on smart contracts. This approach would ensure that the judiciary is not only informed by a clear legislative framework but is also equipped with the understanding necessary to interpret smart contracts in a manner that is consistent, predictable, and aligned with the technological realities of the digital age.

The enforceability of smart contracts within the Malaysian legal system represents a critical junction at which traditional legal doctrines encounter the innovative mechanisms of digital transactions. The foundational legal principle, viewing contracts as agreements necessitating human oversight for both execution and dispute resolution, is challenged by the advent of smart contracts. These digital agreements, characterised by their autonomous execution upon predefined conditions, introduce a paradigm where judicial intervention may be bypassed, raising profound questions about the available mechanisms for resolving disputes that arise from such contracts.

The immutable and decentralised nature of blockchain technology, which underpins smart contracts, further complicates this scenario. It disrupts traditional methods of legal recourse and contract amendment, presenting a unique conundrum for the legal system. The resolution of disputes stemming from smart contracts necessitates a departure from conventional approaches, due to the technology's ability to execute transactions without direct human control and to record these transactions in a manner that is both permanent and resistant to unilateral modifications.

In the Malaysian case of Robert Ong Thien Cheng v Luno Pte Ltd & Anor[143] illuminates the Malaysian judiciary's capacity to adapt legal principles to the realm of emerging technologies, showcasing a notable flexibility in dealing with the intricacies of digital transactions and smart contracts. This case underscores the judiciary's adaptability, yet it simultaneously signals a pressing need for a more structured and systematic legal framework. Such a framework would adeptly address the nuances inherent in digital transactions, especially those involving smart contracts, aligning the autonomous operations of these contracts with the core tenets of contract law and dispute resolution. The evolution of technology necessitates a legal system that is both responsive and effective, ensuring that foundational legal principles can be applied reliably in the context of technological advancement.

To address the emerging legal challenges posed by smart contracts and digital transactions, the establishment of a specialised technological division within the judiciary of countries like Singapore and Malaysia represents a forward-looking approach to

[143] *Robert Ong Thien Cheng v Luno Pte Ltd & Anor* [2020] 3 AMR 143.

modernising the legal framework. Singapore has made notable progress in this area with the creation of the Technology, Infrastructure and Construction List (TIC List) within the Singapore International Commercial Court (SICC)[144]. This list is specifically designed to handle disputes involving technology, infrastructure, and construction projects, showcasing innovative case management protocols and optional voluntary processes such as the Simplified Adjudication Process and the Pre-Action Protocol. These measures are aimed at efficiently managing technically complex disputes as well as ensuring that cases are heard by experts in the field, thereby improving the transparency and effectiveness of legal proceedings.

On the other hand, Malaysia's commercial courts, which already have divisions specialising in areas like admiralty, construction, and intellectual property, hint at a framework that is adaptable to specialised needs. However, the need of having a division dedicated to technology would significantly enhance the judiciary's ability to deal with disputes arising from digital contracts by combining the legal insight of judges and lawyers with the technical insights of engineers and IT specialists. This would bridge the existing gap between traditional legal practices and the specialised requirements of digital contracts, thus reinforcing the judiciary's capability to navigate technology-centric legal issues and demonstrating a proactive stance towards integrating the legal system with the digital economy.

The adoption of alternative dispute resolution (ADR) tailored for smart contracts suggests a viable solution to efficiently resolve conflicts within the digital context of these agreements. By embodying the decentralised and automated nature of smart contracts, such ADR mechanisms could offer a dispute resolution process that is both swift and equitable, resonating with the operational dynamics of smart contracts.

In addressing disputes arising from smart contracts, two distinct methods have emerged: smart dispute resolution[145] and blockchain-based arbitration. Smart dispute resolution mechanisms are online platforms that aim to resolve disputes without traditional recognition and enforcement procedures. This method leverages crowd-sourced adjudication to resolve disputes. A group of users votes on the outcome, and oracles, acting as neutral intermediaries, input this decision into smart contracts[146]. While efficient for small-value, high-volume disputes involving on-chain assets, this approach raises concerns about the quality of decision-making, impartiality, and lack of legal enforceability[147]. It essentially reshapes dispute resolution, prioritising speed and automation over procedural fairness and justice[148].

[144] Singapore International Commercial Court, 'The Technology, Infrastructure and Construction List (SICC)', <https://www.judiciary.gov.sg/singapore-international-commercial-court#:~:text=The%20Technology%2C%20Infrastructure%20and%20Construction%20List%20(%E2%80%9CTIC%20List%E2%80%9D,to%20infrastructure%20and%20construction%20projects> accessed 25 October 2024.
[145] Palombo, Battaglini and Cantisani (n 26).
[146] ibid.
[147] Ortolani (n 26).
[148] ibid.

On the other hand, an innovative development in this area is blockchain-based arbitration[149], which aims to combine the benefits of distributed ledger technology with the enforceability of traditional arbitration. This approach seeks to create legally binding procedures that produce enforceable awards, potentially recognised under international conventions like the 1958 New York Convention. This method involves a predefined number of impartial arbitrators who conduct proceedings in compliance with legal standards, resulting in legally binding and enforceable awards. The arbitration clause and procedures are embedded within the smart contract from the outset, allowing the arbitral award to be recognised by the smart contract and automatically enforced on the blockchain. Blockchain-based arbitration combines the enforceability of traditional arbitration with the efficiency of blockchain technology, making it suitable for complex, higher-value disputes that require legal expertise. However, it faces challenges in integrating arbitration procedures into smart contracts, enforcing decisions involving off-chain assets, and potentially reintroducing complexities and costs associated with traditional arbitration. However, practical implementation may prove arduous.

A critical point to consider is the scenario in which an arbitral award is granted to a party utilising a smart contract, especially when the monetary arbitration award is not encompassed within the original terms of the smart contract[150]. To ensure effectiveness, the arbitration procedures must be integrated into the smart contract from the outset. This means that the smart contract should inherently include the option for arbitration, thereby standardising the contract to accommodate such resolutions[151]. For the award to be recognised and implemented by the blockchain infrastructure, it would need to be introduced into the system via an oracle by the arbitral tribunal. This incorporation allows the smart contract to execute the tribunal's award.

Despite the appeal of combining blockchain technology with arbitration, implementation faces significant challenges. Parties may be unwilling to lock significant amounts of cryptocurrency in escrow for extended periods due to liquidity needs and the volatility of cryptocurrencies. This economic consideration limits the viability of blockchain-based, self-enforcing arbitration for higher-value disputes. Moreover, the self-enforcing nature of blockchain mechanisms is limited to assets that exist on the blockchain. Disputes involving "off-chain" assets or requiring remedies beyond the blockchain's scope cannot be fully resolved through blockchain mechanisms alone, necessitating reliance on traditional legal enforcement procedures.

The key difference between the two methods lies in their approach to legal enforceability and procedural fairness. Smart dispute resolution offers speed and automation but lacks legal recognition and may compromise justice due to its reliance on

[149] Salger (26).
[150] Wong (n 50).
[151] D W Allen, A M Lane and M Poblet, 'The Governance of Blockchain Dispute Resolution' (2019) 25 Harv Negot L Rev 75.

economic incentives and non-expert adjudication. Blockchain-based arbitration provides legally enforceable outcomes and adheres to due process but may conflict with the decentralised nature of smart contracts and requires more complex integration and higher costs. These differences have significant implications for legal frameworks, as they determine the extent to which dispute resolution outcomes are recognized and enforceable under existing laws.

To effectively address disputes arising from smart contracts, it is crucial to design dispute resolution mechanisms that align with traditional legal principles while leveraging technological innovations. This means ensuring that mechanisms like blockchain-based arbitration are carefully integrated into smart contracts to provide both on-chain efficiency and off-chain legal enforceability. Such integration helps bridge the gap between the capabilities of smart contracts and the requirements for enforceable judgments and awards, ensuring that technological advancements enhance rather than undermine the legal safeguards essential for fair and just dispute resolution.

In light of potential abuses, Cuttell[152] suggests the appointment of a neutral adjudicator to resolve disputes between parties, such as landlords and tenants, within smart tenancy agreements. This adjudicator would have the authority to enforce decisions by instructing the smart tenancy program to issue payments to the rightful party as necessary[153]. However, this approach seemingly contradicts the inherent purpose of smart contracts, which aim to reduce the need for third-party enforcement and thereby achieve cost savings in enforcement and compliance. Moreover, integrating third-party adjudicators introduces challenges regarding the independence and impartiality required for arbitration, and may not meet the legal standards necessary to qualify as an arbitral process. This highlights a tension between the theoretical advantages of smart contracts and the practical need for dispute resolution mechanisms in certain contexts.

Therefore, while blockchain technologies and smart contracts offer promising avenues for innovative dispute resolution mechanisms, integrating these with existing legal frameworks remains complex. The limitations of self-enforcement, especially for off-chain assets, and the challenges in ensuring legally enforceable outcomes necessitate careful consideration. As the technology evolves, there may be potential for broader application, but for now, reliance on traditional recognition and enforcement procedures remains essential for certain types of disputes.

Furthermore, it is crucial for Malaysia and Singapore to proactively update its legal and regulatory framework to incorporate smart contracts and digital assets. Such updates should clearly define the guidelines for the creation, execution, and enforcement of smart contracts, considering the unique aspects of digital assets and blockchain technology.

[152] Henry Cuttell, 'Blockchain-based Smart Tenancy Agreements' (Individual Project Report, Imperial College London, 2017) at <https://www.imperial.ac.uk/media/imperial-college/faculty-of-engineering/computing/public/1617-ug-projects/Henry-Cuttell---Blockchain-based-Smart-Tenancy-Agreements.pdf> accessed 25 October 2024.
[153] Yong, Tay and Khong (n 14).

Establishing clear legal parameters for smart contracts would enhance clarity and predictability for participants in digital transactions. This step is essential for maintaining both Singapore and Malaysia's position as a technologically inclusive and progressive jurisdiction, ensuring that its legal system remains equipped to handle the complexities of digital innovation. By drawing on the experiences of the UK and perhaps some common in integrating smart contracts into their legal systems, Singapore and Malaysia can develop robust guidelines that support technological advancement while safeguarding legal certainty and consumer protection.

8 Conclusion

Our comprehensive examination of smart contracts and blockchain technology within the legal frameworks of Malaysia and Singapore in the context of Malaysian and Singaporean law demonstrates a complex interaction between long-standing legal customs and cutting-edge technological advancements. Both jurisdictions, grounded in the common law principles inherited from the United Kingdom, exhibit a remarkable level of adaptation and flexibility. This common law foundation equips them to manage the complex challenges introduced by blockchain and smart contracts, benefiting from the adaptability that judicial precedent allows. Nonetheless, the incorporation of these technologies poses distinct obstacles that need for a methodical approach to judicial and regulatory adjustment that honours both technological progress and legal tradition.

Central to these challenges is the imperative to balance technological neutrality with operational specificity. While existing laws permit the inclusion of digital contracts, the unique attributes of blockchain technology and the self-executing nature of smart contracts underscore the need for legislative and judicial advancements to ensure clarity, predictability, and consistency. Initiatives inspired by the UK's approach, including the UKJT Legal Statement on Cryptoassets and Smart Contracts[154], and the Law Commission Report on Smart Legal Contract[155], serve as valuable models. Given the UK's historical influence on Malaysian and Singaporean law, UK frameworks provide a reliable basis for adaptation. Instead of overhauling traditional legal theories, Malaysia and Singapore could benefit from implementing targeted legal clarifications that formally identify the unique characteristics of smart contracts inside their common law systems. These revisions could specifically clarify coded agreements' contractual nature, ensuring that essential principles like as offer, acceptance, and consideration are clearly applicable to smart contracts. This approach would not only bridge the gap between established legal principles and modern technology, but it would also provide courts and legal practitioners with clear, practical direction when interpreting digital contracts.

[154] UK Jurisdiction Taskforce, Legal statement on cryptoassets and smart contracts (n 133).
[155] Law Commission, Smart legal contracts, advice to government (n 132).

Case studies demonstrate the judiciary's existing capacity to adapt traditional doctrines to novel digital contexts. However, the swift nature of digital transformation calls for more structured guidance. Malaysia and Singapore could consider issuing official statements or guidelines that establish a clear legal basis for smart contracts without the need for additional legislation. This approach would clarify foundational contract principles within the scope of smart contracts, reinforcing the position of coded agreements within the legal system while providing flexibility for judicial interpretation. Such guidelines would support consistent application and predictability, which are crucial in ensuring that businesses and individuals engage confidently in digital transactions.

Guidelines should provide clear definitions of key Sharia-compliant terms in Islamic finance smart contracts, such as "interest-free," "profit-sharing," and "ethical investment". These definitions will help courts bridge the gap between common law principles and Islamic finance practices by appropriately interpreting digital financial agreements. Regulators should encourage the development of common code libraries for smart contracts in order to create a safe and legal environment for digital transactions. These libraries, which have been validated to meet legal and regulatory criteria, have the potential to speed up contract execution and ease interpretation, particularly for complex contracts or high-stakes transactions. Certification processes that check code for safety, data handling, and consumer protection would make contracts function better and be easier to enforce legally. Also, adding ways to resolve disputes directly within smart contracts could help prevent unexpected issues, ensuring both safety and fairness, especially in high-value transactions.

Further, these regulatory efforts should place consumer protection at the forefront. Adopting user-friendly interfaces and requiring "cooling-off" periods would safeguard users who might not completely comprehend the terms contained within the contracts, as smart contracts allow for a wider spectrum of participants, including non-technical individuals. Complying with national and international data protection laws, including the PDPA and GDPR, would add a vital layer of security to contracts that deal with sensitive information. Moreover, aligning smart contract frameworks with anti-money laundering and financial compliance standards, especially for transactions involving substantial assets, is essential for upholding the financial system's integrity and meeting global compliance standards.

The wide use of smart contracts, from tenancy agreements to financial services and public sector management, illustrates both their transformative potential and the intricate legal considerations required to fully leverage this technology. These applications underscore areas where additional, specific guidance is necessary—particularly for cross-border transactions, where jurisdictional conflicts and differing regulatory standards may complicate enforcement and adjudication. Provisions for the cross-border recognition and enforcement of Sharia-compliant contracts could also be included in guidelines to facilitate international transactions in Islamic finance. This would make it clearer how these agreements relate to other jurisdictions and Islamic finance

regimes. Clear statutory definitions around cross-border enforceability are essential to create a seamless framework that can uphold the rights and obligations of all parties involved, even across jurisdictions. Providing clarity on issues like cross-border enforceability of judgments, mechanisms for enforcing awards related to smart contracts, and criteria for recognising international smart contract frameworks would significantly bolster legal certainty and support cross-jurisdictional transactions.

Malaysia and Singapore can create a framework that is future-ready while respecting their own legal, cultural, and economic contexts by utilising the UK as a model and taking inspiration from its adaptable regulatory approaches. This approach would set a precedent for integrating traditional legal frameworks with modern technologies. Establishing a regulatory framework that is clear yet adaptable—ensuring guidelines are precise but not overly rigid—will allow Malaysia and Singapore to strike an effective balance between safeguarding their common law principles and embracing innovation. The framework would also enable the smooth integration of Islamic finance principles with these developments, maintaining Malaysia and Singapore at the forefront of digital finance that complies with Sharia law while fostering global competitiveness. As the legal landscape changes with technology, this dual approach maintains justice, fairness, and openness at its core while simultaneously fostering development and efficiency in digital commerce. Both countries are in a strong position to take the lead in digital legal frameworks in Southeast Asia and beyond because they place a high priority on consumer protection, flexibility, and clear rules.