

# Digitalizing the End-to-End International Trade Finance Process and the Law: A Mission for the Entire Ecosystem

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## Abstract

This article considers the digitalization of the end-to-end trade finance process. Given that the emergence and adoption of innovative technologies in trade finance have made full digitalization possible, this article argues that digitalizing the entire trade finance process is a mission for the entire trade finance ecosystem: to successfully digitalize the full trade finance process, one would need to get all the parties involved on board. It also argues that innovation is only one piece of the puzzle and supporting legal frameworks and recognized standards are essential to accelerate the digitalization journey. Divided into seven parts, the article outlines the development of the trade finance industry, focusing on the main challenges and the legal responses to digitalization, before assessing why digitalization the entire process is hard to scale. It discusses disruptive technologies in trade finance, concluding that collaboration between the trade finance industry parties and removing legal uncertainty can assist in accelerating the digitalization transformation.

## Keywords

Digitalizing the end-to-end process, trade finance, disruptive technologies, blockchain, standardisation and harmonisation, MLETR, URDTT

## 1. Introduction

Trade finance – a market worth USD eight trillion in 2021 – is one of the backbones of global trade.<sup>1</sup> By its nature, trade finance is a heavily paper-based industry as it relies on ownership of title documents. This reliance on paper is further attributed to

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<sup>1</sup> Valuates Reports, *Global Trade Finance Market Size, Manufacturers, Supply Chain, Sales Channel and Clients, 2022-2028* (2020), <https://reports.valuates.com/market-reports/QYRE-Auto-6X849/global-trade-finance>.

the diverse array of legal and regulatory obligations governing the industry.<sup>2</sup> Processes that currently support the global trade finance ecosystem – that is, the processes and entities involved in trade finance – are extremely focused on documentation and checking.<sup>3</sup> Global Trade Review estimates that a trade finance transaction may require up to 36 original documents<sup>4</sup> and 240 copies from as many as 27 parties.<sup>5</sup> An end-to-end process can often take weeks to complete. The spread of digitalization and digital services in the broader society has led to calls for similar applications in the trade finance sector.<sup>6</sup> However, embracing digital innovations in the trade finance industry has been very slow, trailing behind the rapid digitalization advancements made by the financial services and banking sectors.<sup>7</sup>

Many of the complexities in trade finance are driven by the fact that each trade finance transaction requires the input of a large number of entities in different locations worldwide, including, for example, buyers, sellers, banks, customs authorities, insurance companies and carriers. Each entity has a unique mix of internal and external requirements to comply with. Importantly, they are at very different levels on the technology adoption curve. These variations present one of the main challenges for the trade finance industry to digitalize.

Although several attempts to digitalize this industry have been made over recent years, including introducing new technologies and using electronic versions of existing documents, they did not gain sufficient take-up to materially reduce the reliance on documents and manual processes.<sup>8</sup> Those attempts have demonstrated the importance of collaboration among industry participants and inspired developments in the law that generally applies to digital trade and trade finance.

The emergence and adoption of new technologies in trade finance and trade generally have made full digitalization possible. Digitalization here refers to the incorporation of digital technologies into traditional trade finance processes and practices, rather than simply replacing paper documents with electronic versions (digitization) (the difference between digitalization and digitization is discussed in section 3). Existing legal literature on trade financing innovation focuses mainly on trade finance

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<sup>2</sup> Organisation for Economic Co-operation and Development (OECD), *Trade Finance for SMEs in the Digital Era*, OECD SME and Entrepreneurship Papers No. 24 (2021), <https://www.oecd.org/economy/trade-finance-for-smes-in-the-digital-era-e505fe39-en.htm>.

<sup>3</sup> Ebenezer Adodo, *Letters of Credit: Law and Practice on Compliance*, 11 (Oxford University Press 2014).

<sup>4</sup> International Chamber of Commerce (ICC), *Global Trade – Securing Future Growth* (2018), <https://iccwbo.org/content/uploads/sites/3/2018/05/icc-2018-global-trade-securing-future-growth.pdf>.

<sup>5</sup> Global Trade Review, *Blockchain Energy Consumption: Trade Digitisation's Inconvenient Truth?* (2019), <https://www.gtreview.com/magazine/volume-17-issue-3/blockchain-energy-consumption-trade-digitisations-inconvenient-truth/>.

<sup>6</sup> Jane Winn, *Will Blockchain Transform Trade Finance?* in Christopher Hare & Dora Neo (eds), *Trade Finance: Technology, Innovation and Documentary Credits*, 230 (Oxford University Press, 2021).

<sup>7</sup> Ibid.

<sup>8</sup> OECD, *Trade Finance in the COVID Era: Current and Future Challenges* (2021), <https://www.oecd.org/coronavirus/policy-responses/trade-finance-in-the-covid-era-current-and-future-challenges-79daca94/>.

*product* innovation such as using blockchain in the letter of credit or utilising digital trade finance instruments (e.g. bank payment obligations).<sup>9</sup> However, digitalizing the *end-to-end* trade finance *process* has never been comprehensively discussed. This article addresses this gap, examining the digitalization of the *end-to-end* trade finance *process*. It raises novel questions about whether the current trade finance legal framework is sufficient for allowing the transition to a fully digital system and whether the legal obstacles concerning the developments in technological applications in trade finance industry are reflected in the international standards and rules. It identifies the key challenges and barriers that impede the successful digitalization of the end-to-end trade finance process, and the factors that contribute to or hinder the attainment of critical mass in the adoption of digitalization within the trade finance ecosystem. By distinctively analysing digitalizing the *full* trade finance process, the article considers the process from the time of signing the sales contract to completing the transaction without requiring human intervention.

The justifications often put forth to support investments in new technologies can be better understood as rationales for investing in business process reengineering (BPR). According to Michael Hammer, BPR is the essential rethinking and radical redesign of business processes to attain dramatic improvements in crucial, contemporary measures of performance, such as quality, cost, speed and service.<sup>10</sup> Therefore, this article will draw on BPR (paradigm shift) theory as a conceptual framework to demonstrate the importance of migrating existing trade finance processes and systems to newer technology architectures and investing in technologies. Implementing newer technology architectures for existing trade finance processes and systems embodies BPR. Technological innovations can play a vital role in reengineering the trade finance process and provide a better value proposition in terms of validity, transparency, and disintermediation of the process. The following discussions will show the benefits that digitalization, and the consequent paradigm shift, can bring for each party in the trade finance ecosystem.

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<sup>9</sup> I am not aware of any existing works on digitalising the end-to-end trade finance process that could lead to moving to a fully digital trade finance system. See for example, Agasha Mugasha, *The Bank Payment Obligation as a Signal Step in the Evolution of Digital Trade Finance* in Christopher Hare & Dora Neo (eds), *Trade Finance: Technology, Innovation and Documentary Credits*, 256 (Oxford University Press, 2021); Winn, *Supra* n.6; Miriam Goldby, *Digitalisation of Shipping and Insurance Documents Implications for Trade Finance* in Hare and Neo (eds), *ibid*, 198 (2021); Mark Shope, *The Bill of Lading on the Blockchain: An Analysis of its Compatibility with International Rules on Commercial Transactions* 22 *Minn.J.L.Sci.&Tech* 163, 195 (2021); Koji Takahashi, *Blockchain Technology for Letters of Credit and Escrow Arrangements* 135 *Banking L. J.* 89, 95 (2018); Shuchih Ernest Chang et al, *Blockchain-Enabled Trade Finance Innovation: A Potential Paradigm Shift on Using Letter of Credit* 12 *Sustainability* 188, 191 (2020).

<sup>10</sup> Michael Hammer & James Champy, *Reengineering the Corporation: A Manifesto for Business Revolution*, 32 (HarperBusiness 1993); Michael Hammer, *Reengineering Work: Don't Automate, Obliterate* (1990) *Harvard Business Review* (20 October 2022) <https://hbr.org/1990/07/reengineering-work-dont-automate-obliterate>; Brian Harrison & Maurice Pratt, *A Methodology for Reengineering Businesses* 21 *Planning Review* 6, 9 (1993).

This article argues that technical innovation is only one piece of the puzzle and effective legal frameworks and recognized standards are essential to accelerate the digitalization journey. The discussion will show that the legal barriers regarding the developments in technological applications in trade finance are reflected in the international standards and rules. However, many regulatory and legal questions remain unanswered in relation to emerging technologies such as blockchain. This article examines the uncertainty around rules and regulations, focusing on international initiatives.

This article also argues that digitalizing an end-to-end trade finance process is a mission for the entire trade finance ecosystem: to successfully digitalize the full trade finance process requires cooperation and buy-in from all the players involved. It also emphasizes that deeper coordination and collaboration between the parties in the trade finance ecosystem is crucial in helping digitalization reach critical mass.

Since this article focuses on the end-to-end digitalization, it strives also to uniquely classify the technological innovations according to their role and function in the digitalization process. This classification is necessary to understand the standardisation efforts and legal developments in trade finance and to show that the legal developments are aligned with the progress in technology. While this article will concisely discuss important emerging technologies in the trade finance sector, it will focus mainly on blockchain due to its potential role in accelerating the digitalization process.

The remainder of article is divided into six parts. Part 2 sheds light on the development of the trade finance industry, highlighting the key characteristics of the documentary trade finance. Part 3 considers the meaning and importance of digitalizing the end-to-end process, focusing on why digitalization is hard to scale. Part 4 examines the legal responses to the digitalization of trade finance. Part 5 discusses disruptive technologies in trade finance, classifying them according to their role and function. Part 6 examines how to accelerate the digitalization transformation, with a particular focus on collaboration between the trade finance industry parties and removing legal and regulatory uncertainty. Part 7 is a conclusion.

## 2. A Historical Overview of Trade Finance

To effectively implement BPR, a comprehensive understanding of the existing processes and their impediments is necessary; here, the traditional trade finance process. Trade finance is an umbrella term that describes a wide range of products offered to importers and exporters to support cross-border transactions.<sup>11</sup> While some global trade transactions are paid for in advance, the large majority have to be financed in some way. This is mainly due to the lack of trust between importers and exporters

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<sup>11</sup> Bank for International Settlements, *Trade Finance: Developments and Issues* (2014), <https://www.bis.org/publ/cgfs50.pdf>.

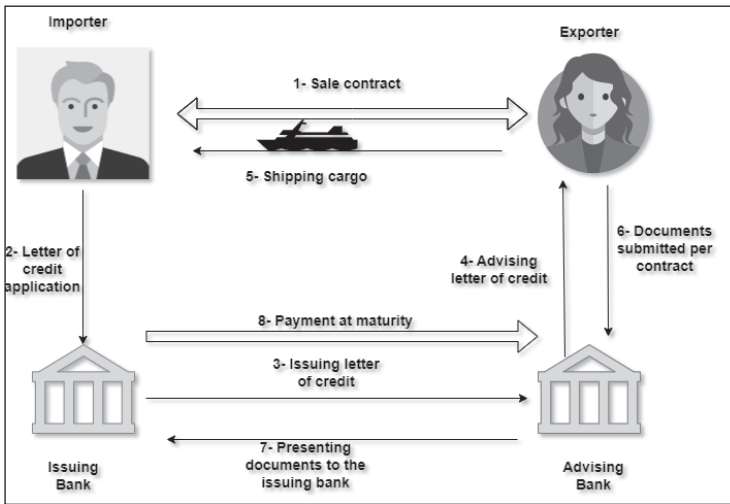


Figure 1. Letter of credit process

which requires a neutral intermediary to safeguard their rights.<sup>12</sup> Trade finance products help both sides of a transaction manage their international payments and associated risks and can also be used to provide needed working capital.<sup>13</sup> Trade finance has evolved as one of the backbones of global trade, supporting around 80-90% of world trade activities.<sup>14</sup> For centuries, global trade and trade finance have been carried out through voluminous, complex and manual-based documentation processes.<sup>15</sup> The letter of credit – also called documentary credit – is one of the most utilized and secured bank-intermediated methods of financing international trade.<sup>16</sup> The letter of credit, as a payment and financing instrument, relies mainly on the role of banks and their extensive communication networks to facilitate cross-border transactions between importers and exporters (figure 1).<sup>17</sup> To bridge the informational gap and

<sup>12</sup> Beverly Kracher, Cynthia L. Corritore & Susan Wiedenbeck, *A foundation for Understanding Online Trust in Electronic Commerce* 3 J. Inf. Commun. Ethics Soc, 131, 135 (2005); World Trade Organization (WTO), *Trade Finance and SMEs: Bridging the Gaps in Provision* (2016), [https://www.wto.org/english/res\\_e/publications\\_e/tradefinsme\\_e.htm](https://www.wto.org/english/res_e/publications_e/tradefinsme_e.htm).

<sup>13</sup> Anders Grath, *The Handbook of International Trade and Finance*, 133 (2<sup>nd</sup> ed Kogan Page 2012).

<sup>14</sup> WTO, *supra* n.12.

<sup>15</sup> ICC, *ICC Trade Register Report Summary: Global Risks in Trade Finance* (2014), <https://www.tradefinance.training/library/files/ICC%20Trade%20Register%20Report%20Summary%202014.pdf>.

<sup>16</sup> Sandra Booyen, *The Letter of Credit as a Contract* in Christopher Hare & Dora Neo (eds), *Trade Finance: Technology, Innovation and Documentary Credits*, 32 (Oxford University Press, 2021); *Intraco Ltd v Notis Shipping Corporation*, [1981] 2 Lloyd's Rep 256 (CA).

<sup>17</sup> Agasha Mugasha, *The Law of Letters of Credit and Bank Guarantees* (Federation Press, 2003); Peter Ellinger & Dora Neo, *The Law and Practice of Documentary Letters of Credit* (Hart Publishing 2010); Ali Malek & David Quest, *Jack: Documentary Credits* (4th Revised ed, Tottel Publishing 2009).

possible distrust among the commercial parties, banks act as impartial document checkers and payers.<sup>18</sup> Payments are only made to the beneficiaries if the banks are satisfied that the documentary conditions agreed by the parties are met.<sup>19</sup>

The letter of credit has had massive success in facilitating international trade transactions. There are various reasons behind this success: the creation and development of the Uniform Customs and Practice for Documentary Credits (UCP) by the International Chamber of Commerce (ICC) that reflect and harmonize market practice;<sup>20</sup> the adoption of the strict compliance and autonomy principles that limit the defences to payment to the beneficiary;<sup>21</sup> and the use of a network of banks to ensure that the beneficiary's payment and rights are regulated as far as possible by its own domestic law. The reliance on the letter of credit accounted for nearly 40% of the total trade finance product in 2016.<sup>22</sup> However, its use is now declining,<sup>23</sup> with trading parties preferring supply chain financing (SCF)<sup>24</sup> and open account methods of payment.<sup>25</sup> Today, open account trade accounts for 45% of trade finance revenues. Boston Consulting Group (BCG) forecasts that by 2027, this figure will have increased to around 60%.<sup>26</sup> A major factor driving commercial parties to shift trade from the letter of credit to open account has been the technological developments which have made communication and the exchange of information between market participants over the internet much easier.<sup>27</sup>

### 3. Digitalizing the End-To-End Trade Finance Process

The drive to digitalize trade and trade finance processes is neither new nor recent.<sup>28</sup> However, technological developments in the financial industry accelerated after the

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<sup>18</sup> Mugasha, *supra* n.9.

<sup>19</sup> *Ibid.*

<sup>20</sup> The latest revision of UCP is the sixth (UCP 600, 2007) revision of the rules since they were first promulgated in 1933.

<sup>21</sup> See Adodo, *supra* n.3, at 154.

<sup>22</sup> ICC, *ICC Trade Register Report Summary: Global Risks in Trade Finance* (2016), <https://www.icc-switzerland.ch/images/8.ICC-Trade-Register-Report-2016.pdf>.

<sup>23</sup> Christopher Hare, *Something Old, Something New: Open Account, Prepayment, and Supply Chain Finance* in Christopher Hare & Dora Neo (eds), *Trade Finance: Technology, Innovation and Documentary Credits*, 274 (Oxford University Press, 2021).

<sup>24</sup> SCF refers to instruments such as factoring, forfaiting and other products that address sellers' financing needs by anticipating the liquidity resulting from trade transactions. OECD, *Supra* n.2.

<sup>25</sup> An open account transaction is an instrument of payment where the goods are shipped and delivered before payment is due, without relying on documentary credit issued by a bank. Sang Kim, *Payment Methods and Finance for International Trade*, 69 (Springer Singapore 2020).

<sup>26</sup> Boston Consulting Group, *Digital Ecosystems in Trade Finance: Seeing Beyond the Technology* (2019), <https://www.bcg.com/digital-ecosystems-in-trade-finance-seeing-beyond-the-technology>.

<sup>27</sup> Hare, *supra* n.27.

<sup>28</sup> Marco Polo Network, *The Evolution of Trade Finance: Blockchain Signals New Era* (2020), <https://marcopolonetwork.com/evolution-of-trade-finance-blockchain/#:~:text=Blockchain%20in%20trade%20finance%20facilitates,superior%20audit%20and%20compliance%20capabilities.>

global financial crisis of 2008<sup>29</sup> due to the emergence of new financial technology companies (Fintech companies) which offered various financial services that were previously the preserve of traditional financial institutions such as banks and insurance companies.<sup>30</sup> The fintech companies offer cost-effective and efficient financial services solutions.<sup>31</sup> Their entry into business accelerated the pace of innovation in the wider financial industry, particularly in financing and making payments in international trade.<sup>32</sup> Thus, a variety of technologies are being proactively introduced from artificial intelligence (AI) and optical character recognition (OCR) to the distributed ledger (DLT) and smart contracts. Solutions can be configured to be entirely automated end-to-end without requiring human interaction.

The digitalization of trade finance is still in its early stages and lags far behind the digitalization progress made by retail banking and other financial services sectors. The main reason for this has been the limitations of the legacy trade platforms and networks supporting such efforts.<sup>33</sup> Although technology has made some internal processes more digital and efficient, trade finance transactions involving multiple parties remain highly complex, costly, and heavily dependent on paper-based processes. Importantly, there have been attempts to deal with these challenges through digitalization in the past. Platforms, for instance, like essDocs and Bolero have focused on digitalizing trade finance processes.<sup>34</sup> However, because this generally involves digital versions of paper documents (digitization), this research does not see these attempts as true digitalization. To illustrate, digitalization goes beyond just converting paper documents into electronic versions; it involves the integration of digital technologies into various aspects of the trade finance processes and practices. While digitization involves a basic level of transformation by moving from physical documents to digital ones, digitalization involves a more significant transformation of processes, potentially reimagining and redesigning them to fully leverage digital capabilities.<sup>35</sup> Digitization is about using technology to mimic existing processes in a digital format.<sup>36</sup> Thus, digitization might not necessarily involve a fundamental transformation of the underlying processes or business models.

Many of the complexities in international trade finance are driven by the large number of players involved in the facilitation of a single transaction (figure 2).<sup>37</sup> They

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<sup>29</sup> James Baker, *Financing International Trade*, 122 (Praeger, 2003).

<sup>30</sup> Bank for International Settlements, *The Implications of Electronic Trading in Financial Markets* (2001), <https://www.bis.org/publ/cgfs16.pdf>.

<sup>31</sup> Douglas W. Arner, Janos Barberis & Ross Buckley, *The Evolution of Fintech: A New Post-Crisis Paradigm?* (2015) University of Hong Kong Faculty of Law Research Paper No. 2015/047, UNSW Law Research Paper No. 2016-62, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2676553](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2676553).

<sup>32</sup> Simon Fernandez-Vazquez et al, *Blockchain in FinTech: A Mapping Study* 11 Sustainability 1, 15 (2019).

<sup>33</sup> Winn, *supra* n.6.

<sup>34</sup> EssDocs formerly known as Electronic Shipping Solutions (ESS).

<sup>35</sup> Jamil Mina et al, *Digitalization of Financial Services in the Age of Cloud*, 4 (O'Reilly Media 2023).

<sup>36</sup> *Ibid.*

<sup>37</sup> Mugasha, *supra* n.9.

are at different levels of capabilities and technological sophistication, and they may not see the benefits of digitalization. This has considerably hampered the efforts to transform the trade finance sector. This article, therefore, argues in order to effectively digitalize the entire trade finance process, it is necessary to ensure that all relevant parties are in agreement and willing to participate. To illustrate, full digitalization is complex when many links in the chain are not yet digitalized. Focusing on a narrow slice of the entire process is not certainly sufficient as the previous attempts have proved. For example, banks, the most important player in the international trade finance industry, have invested in digitalization predominantly in their distinct parts of the process, such as payment systems, digital channels, or in OCR to digitize documents for processing by internal operations.<sup>38</sup> The common feature running through these attempts is their narrow scope. However, the end-to-end international trade finance process is broader than instruction or application because it requires the digitalization of all parties in the trade finance life cycle. Other players have also been trying for decades to provide digital solutions such as digital platforms to connect all parties involved. Logistics providers, for instance, have provided digital platforms to digitalize the logistics process, but these digital platforms cannot link to the financial side of the transaction.<sup>39</sup> The above discussion suggests that the primary emphasis in the BPR approach should be on accommodating flexibility. By thoroughly understanding the players' needs and environmental factors, the trade financing process can be tailored. This represents the core concept underlying the adaptable design of the trade financing process.

It is significant, therefore, to emphasize that deeper coordination and collaboration between all players in the trade finance ecosystem is crucial in helping digitalization reach critical mass. The role of coordination in BPR between various parties is pivotal for the success of transformative changes. By bringing together the involved parties, collaboration fosters a shared understanding of current processes and challenges. It enables the identification of improvement opportunities and encourages innovative solutions. Ultimately, through open communication and mutual support, coordination ensures the implementation of more effective and sustainable reengineered processes. They should concentrate first on the digitalization already happening in the industry, and on leveraging the benefits of digitalization by enhancing connectivity because working in a hybrid ecosystem of paper and electronic documents is necessary to move to a fully digital ecosystem. Since financial interests are one of the main driving forces behind the uptake of digitalization, the industry should benefit from the demand for digitalization. In that light, more should be done to enhance awareness of digitalization because it is a mindset change around how players think about their roles and processes.

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<sup>38</sup> George Walker, *Financial Technology Law – A New Beginning and a New Future* 50 Int. Lawyer 137, 185 (2017).

<sup>39</sup> Goldby, *supra* n.9.



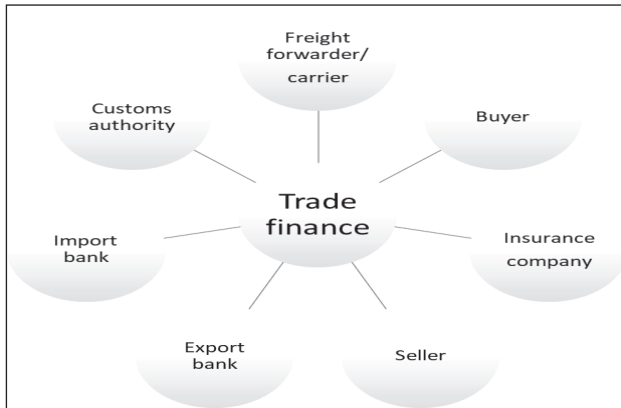


Figure 2. Key players in the trade finance ecosystem

### 3.1. Why Digitalizing International Trade Finance is Hard

Despite notable investment in the trade finance sector, the digitalization of the end-to-end trade finance process has been challenging for various reasons. First, since digitalizing the entire trade finance process requires adopting several technologies such as smart contracts, distributed ledger technology (DLT), artificial intelligence (AI), internet of things (IoT), and OCR, which need substantial investment and resources, there was a slow adoption of these available technologies in many countries among the broad range of the required entities.<sup>40</sup> Secondly, the current trade finance systems are siloed and disconnected. As noted above, trade finance generally involves numerous entities that work closely to complete the transactions. However, there is still no one platform that can connect those entities together. Rather, they use a multitude of platforms to communicate and share relevant documents. These disconnected and legacy systems force all entities in the trade finance ecosystem to undertake a multitude of complicated and costly systems integrations which regularly require maintenance and update.<sup>41</sup> This hinders the efficient digitalization of trade finance. It is also important to mention that the technology initially was not mature to transfer electronic data securely and safely.<sup>42</sup>

Thirdly, uncertainty around rules and regulations is a major impediment facing the digitalization journey. Two main sources of legal uncertainty are significantly relevant: the legal recognition of electronic documents—particularly the electronic bill of lading – and the legal validity of electronic contracts. Many countries do not recognize

<sup>40</sup> ICC, *supra* n.4.

<sup>41</sup> OECD, *supra* n.8.

<sup>42</sup> Agasha Mugasha, *Technological Innovation in Trade Finance and the Law: From the Bank Payment Obligation and Blockchain to the Uniform Rules on Digital Trade Transactions* 38 B.F.L.R 217, 233 (2022).

electronic documents as substitutes for the paper documents and require a “wet signature” and do not recognize the digital counterpart.<sup>43</sup> The varying approaches to the legal recognition of the electronic bill of lading – a fully electronic version of the traditional paper bill of lading, created, transmitted, and stored in digital format – demonstrate the challenge. The bill of lading is arguably the most important document in trade finance.<sup>44</sup> It is a document of title, and its control entitles the person in possession to particular rights, including the delivery of the goods.<sup>45</sup> The legal uncertainty surrounding the lack of legal recognition of the electronic bill of lading raises a significant question about whether the rights in the paper-based bill of lading are replicated in the electronic version. As a response to this legal uncertainty, several national and international initiatives have focussed on this issue of facilitating the use of electronic bills of lading. The international initiatives, which are the focus of this article, can be clearly seen in the MLETR and the URDTT as will be discussed in the following part.

#### 4. Legal Responses to Technological Developments in Trade Finance

Creating a fully digital system in trade finance requires more than just technological innovation, as the primary obstacle is to establish a legal structure that can facilitate this transformation. The parties involved in the trade finance process will not move towards digitalization until the legal framework can provide enough assurance to all of them. Uncertainty around standards, rules, and regulations can be a barrier facing the digitalization journey. Although the law faces challenges in keeping pace with technology, it has also been adapting and evolving alongside technological advancements. The legal responses that facilitate digitalization in trade finance comprise soft law made by the ICC and other supranational bodies – especially the United Nations Commission on International Trade Law UNCITRAL – and hard law made by national governments.<sup>46</sup> Since this article focuses on digitalization of international trade finance processes and on standardization and harmonization, the following discussion focuses on supranational standards and initiatives, particularly the Model Law on Electronic Transferable Records (MLETR) and the Uniform Rules for Digital Trade Transactions (URDTT).

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<sup>43</sup> Tarsem Bhogal & Arun Trivedi, *International Trade Finance A Pragmatic Approach*, 159 (2<sup>nd</sup> ed, Springer International Publishing 2019).

<sup>44</sup> Takahashi, *supra* n.9.

<sup>45</sup> Shope, *supra* n.9.

<sup>46</sup> Chris Southworth, *Call to Action; Let's Make Digital Trade Work For Everyone* (2019), <https://iccwbo.uk/blogs/press-releases/call-to-action-let-s-make-digital-trade-work-for-everyone>.

#### 4.1. *The UNCITRAL Model Law on Electronic Transferable Records (MLETR)*

For over 50 years, UNCITRAL has worked on the modernisation and harmonisation of the law of international trade. Model laws play a critical role in facilitating electronic commerce and trade. To enable and facilitate commerce conducted using electronic means and to support countries to enact laws that facilitated electronic commerce, UNCITRAL adopted Model Law on Electronic Commerce in 1996.<sup>47</sup> This instrument was followed by Model Law on Electronic Signatures (2001) which was based on the earlier Model Law on Electronic Commerce.<sup>48</sup> It aimed at enabling the use of electronic signatures by establishing criteria of technical authenticity for the equivalence between electronic and hand-written signatures.<sup>49</sup> The adoption of these two instruments demonstrates the shift of the global community towards electronic documents in trade.<sup>50</sup> However, they were designed to work in a mixed ecosystem of paper and digital instruments. The common feature of the early initiatives is the focus on the presentation of electronic documents, especially under letters of credit. However, they did not address many legal issues related to the legal equivalence of electronic documents to their paper-based counterparts. Therefore, UNCITRAL introduced MLETR.

The MLETR – which was adopted in July 2017 – is an important global initiative for the facilitation of digital trade. It creates a legal framework for the use of electronic transferable records and establishes their functional equivalence to paper-based records.<sup>51</sup> An “*electronic record*” refers to information generated, communicated, received or stored by electronic means.<sup>52</sup> It makes a crucial shift from paper to paperless trade in major sectors such as trade and trade finance. A transferable document, on the other hand, entitles a person to payment of money or delivery of goods. It is defined as:

A document or instrument issued on paper that entitles the holder to claim the performance of the obligation indicated in the document or instrument and to transfer the right to performance of the obligation indicated in the document or instrument through the transfer of that document or instrument.<sup>53</sup>

To maintain flexibility and accommodate different legal systems and practices across countries, the MLETR does not expressly define an electronic transferable record and it is, therefore, left to national law. However, it can be assumed from the definitions

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<sup>47</sup> UNCITRAL, Model Law on Electronic Commerce (1996).

<sup>48</sup> UNCITRAL, Model Law on Electronic Signatures (2001).

<sup>49</sup> Carolina Laborde, *Electronic Signatures in International Contracts*, 109 (Peter Lang, 2010).

<sup>50</sup> Mugasha, *supra* n.42.

<sup>51</sup> Alan Davidson, *Implementation and Implications of the UNCITRAL Model Law on Electronic Transferable Records in Trade Finance* in Christopher Hare & Dora Neo (eds), *Trade Finance: Technology, Innovation and Documentary Credits*, 218 (Oxford University Press 2021).

<sup>52</sup> UNCITRAL, Model Law on Electronic Transferable Records (2017) (MLETR), art 2.

<sup>53</sup> *Ibid.*

of “transferable document or instrument” and “electronic transferable record” and other relevant provisions that transferable records typically include bills of lading, bills of exchange, promissory notes, warehouse receipts, and cheques.<sup>54</sup>

The MLETR builds on the principles of technology neutrality, non-discrimination against the use of electronic means, and functional equivalence underpinning all UNCITRAL texts on electronic commerce. Neutrality means that laws should not require the use of specific technologies in communicating or storing information electronically.<sup>55</sup> It ensures that it does not restrain the development of any technology or unfairly favour one technology over another. The principle of non-discrimination against the use of electronic means aims at facilitating the cross-border use of electronic transferable records.<sup>56</sup> Article 19(1) provides that an electronic transferable record should not be denied legal effect on the sole ground that it is issued or used abroad.<sup>57</sup> However, this rule, of course, only applies in jurisdictions that have adopted the MLETR.

Further, the principle of functional equivalence requires that writing and signatures whether in paper-based or electronic form should be treated equally by applicable law.<sup>58</sup> Article 10 of the MLETR provides that an electronic transferable record is functionally equivalent to a transferable document where two conditions are met: first, the electronic record should include the information that would be required in the paper-based transferable document.<sup>59</sup> Secondly, a reliable method should be used to identify that electronic record as the electronic transferable record, to make that electronic record capable of being subject to control from its creation until it ceases to have any effect and to maintain the integrity of that electronic record.<sup>60</sup> By legislating that a person can possess and control an electronic record, MLETR supports and facilitates the use of blockchain and smart contracts in trade finance and digital trade generally. While the MLETR enables the use in electronic form of bills of lading, the paper-based form continues to be dominant in international trade due to uncertainty over the legal status of electronic bill of lading in the major trading nations.<sup>61</sup>

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<sup>54</sup> Abhinayan Bal & Trisha Rajput, *Maritime Rules for Rail Carriage: China's Initiative to Incorporate Rules from the Road to the Belt* in Proshanto K. Mukherjee, Maximo Q. Mejia & Jingjing Xu (eds), *Maritime Law in Motion*, 39 (Springer International Publishing, 2020).

<sup>55</sup> Henry Gabriel, *The UNCITRAL Model Law on Electronic Transferable Records* 24 Unif. L. Rev 261, 270 (2019).

<sup>56</sup> Jung-Ho Yang, *Applicability of Blockchain based Bill of Lading under the Rotterdam Rules and UNCITRAL Model Law on Electronic Transferable Records* 23 J. Korea Trade 261, 268 (2019); Essi Puhakainen and Karin Elisabeth Väyrynen, *The Benefits and Challenges of Technology Neutral Regulation – A Scoping Review*, Pacific Asia Conference on Information Systems (2021), <http://jultika.oulu.fi/files/nbnfi-fe2021081843548.pdf>.

<sup>57</sup> MLETR, art 19 (1).

<sup>58</sup> Richard Aikens et al, *Bills of Lading*, 49 (3<sup>rd</sup> ed Taylor & Francis, 2020).

<sup>59</sup> MLETR, art 10.

<sup>60</sup> *Ibid.*

<sup>61</sup> Livashnee Naidoo, *From the Book of Lading to Blockchain Bills of Lading: Dynamic Merchant Tradition and Private Ordering* in Eva Lievens & Gert Vermeulen (eds), *Research Handbook on International Commercial Contracts*, 223 (Edward Elgar Publishing Limited 2020).

The importance of the MLETR in promoting technological innovations lies beyond the handful of states that have adopted it.<sup>62</sup> Its main legislative significance lies in the international endorsements both by the ICC Banking Commission and the G7 Digital and Technological Ministerial Declaration to ‘*promote the adoption of legal frameworks compatible with the UNCITRAL Model Law on Electronic Transferable Records 2017*’.<sup>63</sup> Given the large influence of the ICC and G7 in international trade, these endorsements will likely cause the principles and provisions of the MLETR to be adopted in many jurisdictions.

#### 4.2. *The Uniform Rules for Digital Trade Transactions (URDTT)*

The ICC has proactively supported the use of technologies in trade finance. It adopted the eRules – eUCP<sup>64</sup> and eURC<sup>65</sup> – as supplements to UCP and Uniform Rules for Collections (URC). The eRules were designed to accommodate the presentation of electronic documents under documentary credits and collection instructions, alone or in combination with paper documents, and not on to issuance of an eUCP credit or an eURC collection instruction.<sup>66</sup> Another important initiative by the ICC to support technological innovations in trade finance is the Uniform Rules for Bank Payment Obligations (URBPO) which entered into force on 1 July 2013.<sup>67</sup> The URBPO provide a framework for a bank payment obligation (BPO is explained below). However, the scope is limited to bank-to-bank undertakings. They are deliberately designed to support collaboration between involved banks through the exchange of an agreed set of structured data.<sup>68</sup> Because of the limited scope of the URBPO, the emergence and use of new technologies in trade finance, and the involvement of non-bank financial institutions in trade finance and digital trade, the ICC set out to develop new rules that would accommodate these developments and support digital transformation. Therefore, the ICC, in parallel with ongoing work to promote the MLETR, published URDTT in October 2021.

Compared to the eRules, the URDTT do not supplement existing rules that allow for paper. However, eRules will continue to exist in their own right alongside the URDTT. In contrast to URBPO, the URDTT extend into the corporate space and therefore, cover the electronic contract of sale between seller and buyer, the payment provision of the trade transaction, and any undertakings by non-bank service providers

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<sup>62</sup> Bahrain, Belize, Kiribati, Papua New Guinea, Paraguay, Singapore and United Arab Emirates (Abu Dhabi Global Market).

<sup>63</sup> G7, *Ministerial Declaration G7 Digital and Technology Ministers’ Meeting* (April 2021), <https://www.gov.uk/government/publications/g7-digital-and-technology-ministerial-declaration>.

<sup>64</sup> ICC, *Uniform Customs and Practice for Documentary Credits for Electronic Presentation (eUCP) Version 2.0 2019*.

<sup>65</sup> ICC *Uniform Rules for Collections: Supplement for Electronic Presentation (eURC) Version 1.0 2019*.

<sup>66</sup> Bhogal & Trivedi, *Supra* n.43, at 161.

<sup>67</sup> ICC, *Uniform Rules for Bank Payment Obligations 2013*.

<sup>68</sup> Mugasha, *supra* n.9.

in support of the trade transaction.<sup>69</sup> It is important to note that the URDTT are designed to be compatible with UNCITRAL Model Laws on electronic commerce,<sup>70</sup> electronic signatures,<sup>71</sup> and the MLETR.

The URDTT are neutral to technology and messaging standards, taking into account recent technological developments, not only in blockchain and distributed ledger technology, but also the use of natural language processing (a subset of AI which deals with how computers understand and translate human language), smart contracts, machine learning (a subset of AI which teaches machines how to automatically learn and improve from experience without being explicitly programmed), AI, data analytics (the process of examining, transforming, and interpreting large sets of data to derive insights and support decision-making), and, the Internet of Things, all of which will have a substantial impact on the ways in which businesses are conducted in future.<sup>72</sup> This means that the URDTT can play a vital role in accelerating end-to-end trade finance digitalization by accommodating current instruments and those that may develop in the future.

The URDTT are intended exclusively for a fully digital environment: the trade transaction from buyer to seller and any financing should be performed electronically from the end-to-end.<sup>73</sup> They apply to any party to digital trade transactions and serve as an overarching framework for digital trade transactions, providing global standardization and consistency for the digital connectivity of service providers, and promoting the usage of electronic records and documents. To illustrate, the URDTT cover three different spheres: (1) the electronic contract of sale between seller and buyer, which is the digital trade transaction<sup>74</sup>; (2) the payment obligation of the trade transaction<sup>75</sup>; and (3) an undertaking by a non-bank financial institution or persons, Financial Service Provider (FSP) in support of the trade transaction.<sup>76</sup> The URDTT are the first set of rules that focus on the buyer and seller, particularly, the payment obligation that arises between them. Payment obligation is an irrevocable and definite obligation by the buyer to pay the seller when the seller complies with the terms and conditions of the digital trade transaction.<sup>77</sup> According to Article 12, a conditional payment obligation automatically becomes unconditional and independent upon the seller compliance with the terms and conditions of the digital data transaction. While the seller is responsible for delivering the goods or the supply of services in accordance with a digital trade transaction and providing information required to enable the delivery of goods or the supply of services or any additional information as may be required, the

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<sup>69</sup> ICC, Uniform Rules for Digital Trade Transactions, Version 1.0 (URDTT), art 5.

<sup>70</sup> UNCITRAL, *supra* n.47.

<sup>71</sup> UNCITRAL, *supra* n.48.

<sup>72</sup> ICC, *Implementing URDTT Uniform Rules for Digital Trade Transactions Version 1.0* (2022), <https://2go.iccwbo.org/implementing-urdt-t-uniform-rules-for-digital-trade-transactions-version-1-0.html>.

<sup>73</sup> URDTT.

<sup>74</sup> *Ibid*, art 4.

<sup>75</sup> *Ibid*, art 12.

<sup>76</sup> *Ibid*, art 5.

<sup>77</sup> *Ibid*, art 2.

buyer role includes taking delivery of goods or receiving services and making the payment.<sup>78</sup>

The URDTT also cover the provision of an undertaking by FSPs which is defined as a financial institution or person other than the seller or buyer.<sup>79</sup> An FSP may provide various services including finance, risk mitigation to a beneficiary or buyer or other FSPs, effect payment to the beneficiary, or add a payment obligation and effect payment to the beneficiary when the terms and conditions of the payment undertaking are satisfied.<sup>80</sup> This implies that the roles of the FSPs are identical to those of a bank that issues a letter of credit or BPO. An FSP does not deal with goods and services, rather it only deals with an electronic record submitted under a digital trade transaction.<sup>81</sup>

The foregoing discussion demonstrates that the legal barriers regarding the developments in technological applications in trade finance are reflected in the international standards and rules, especially those adopted by the ICC and UNCITRAL. While the URBPO are bank-centric and particularly about digital bank intermediation in trade transactions, the MLETR establish the functional equivalence of the electronic documents in international trade such as bill of lading and trade-related blockchain. As the most recent legal instrument to adapt to and facilitate technological innovation, the URDTT make a significant contribution to the digitalization of trade finance by establishing the operational rules for the digital trade transaction that apply irrespective of the technology or the type of underlying transaction and the involvement of non-bank service providers. While the URDTT facilitate the transition to a fully digital trade finance ecosystem, they build upon several international previous endeavours which reflect the technological developments in international trade and trade finance.

Although this article focuses on international initiatives, it is significant to mention the UK initiative to legally recognize electronic trade documents, which will likely provoke other jurisdictions to follow suit. On 20 July 2023, the UK introduced the “Electronic Trade Documents Act 2023” (the Act) to Parliament.<sup>82</sup> The Act aims to give certain electronic trade documents the same legal treatment, functionality and effects as their paper equivalent.<sup>83</sup> The Act could revolutionize and modernize global trade and trade finance, given how often English law is chosen as the law of the contract.<sup>84</sup> Before the introduction of the Act, only things that can be physically held were considered as being capable of being possessed. This means that UK law generally did not recognize the possibility of possessing electronic documents. The new rules require trade documents in electronic form to meet specific criteria intended to

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<sup>78</sup> *Ibid*, art 4.

<sup>79</sup> *Ibid*, art 2.

<sup>80</sup> *Ibid*, art 5 (a).

<sup>81</sup> *Ibid*, art 5 (b).

<sup>82</sup> Electronic Trade Documents Act 2023.

<sup>83</sup> Electronic Trade Documents Bill [HL] (2022), cl 3(2).

<sup>84</sup> The Act includes specific exclusions for bearer bonds and uncertificated dated securities under the Uncertificated Securities Regulations 2001.

replicate the main features of paper trade documents.<sup>85</sup> Although the Act allows businesses to choose to use electronic trade documents, they would not be required to use them. Interestingly, it allows the paper documents to be converted to electronic documents and the electronic documents to be converted to paper ones.<sup>86</sup>

## 5. Disruptive Technologies in Trade Finance

After examining the main challenges facing the digitalization of the end-to-end trade finance process and the legal responses to digitalization, it is important to explore the digital technologies disrupting trade finance and can help achieve full digitalization. Innovative technologies play a pivotal role in ensuring the success of BPR in international trade finance by fundamentally transforming traditional processes and unlocking new possibilities for efficiency and innovation. The investments in technological innovations will be justified as investing in BPR. The main goal of reengineering trade finance processes is to create value for every entity involved in the trade finance ecosystem.<sup>87</sup> Cheng and Wang argue that *'the benefits brought by the quality of implementing BPR will drive major cost savings and operational efficiencies and increase the speed and quality of production'*.<sup>88</sup> As noted previously, the last decade has produced various far-reaching technological innovations reshaping the industry and leading to a new era of digital trade finance. Technological advancements have always been supported by international standards and rules as demonstrated above. Since each technology can have a significant role in digitalizing the full trade finance process, this article strives to distinctly classify the technological innovations according to their role and function: (1) technologies that aim at making paper-based trade easier; (2) technologies designed to digitalize the flow of information in trade and trade finance; and (3) technologies or instruments changing how trade finance operates. While some of these technologies can help achieve internal digitalization, others can play a vital role in connecting various technologies and parties.

### 5.1. Technologies that Aim at Making Paper-Based Trade Easier

This type of technology can play a central role in achieving internal digitalization and making trade finance cheaper and faster. This article focuses particularly on OCR as a game-changing innovation. OCR is an innovation that converts printed or scanned text images, such as printed documents or handwritten, into machine-encoded text

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<sup>85</sup> Electronic Trade Documents Act 2023, s 2.

<sup>86</sup> *Ibid*, s 4.

<sup>87</sup> Youngohc Guimaraes & Aaron Clevenson, *Exploring Expert System Success Factors for Business Process Reengineering* 15 J. Eng. Technol. Manage 179, 189 (1998); Peter Drucker, *Management: Tasks, Responsibilities, Practices*, 61 (Harper & Row 1973)..

<sup>88</sup> Eric Y. Cheng & Ying Wang, *Business Process Reengineering and ERP Systems Benefits*, Proceedings of the 11th Annual Conference of Asia Pacific Decision Sciences Institute, 201, 211 (2006).



that can be processed further.<sup>89</sup> Since Trade finance is document-intensive, it requires the examination of various documents. This examination is time-consuming, requiring skilled and experienced staff and can take days or even weeks, creating material delays, and even unexpected outcomes such as a refusal of the shipment or financial loss.<sup>90</sup> OCR technology has proven highly effective at addressing those pain points by increasing productivity in operationally intensive tasks.<sup>91</sup> However, it is significant to distinguish between different generations of OCR. Standard or basic OCR recognizes and converts text and handwriting from trade documents into digital format, allowing data input employees to copy and paste the content into the back-end fields.<sup>92</sup>

The second generation is intelligent OCR, which learns to recognize document templates and automatically transfers paper-based text and handwritten content into back-end fields.<sup>93</sup> Many international banks, such as HSBC and Citi are now investing greatly in intelligent OCR.<sup>94</sup>

The third generation is machine intelligence OCR which automatically transfers paper-based text and handwritten content into back-end fields, screens documents for compliance and consistency, and feeds data into issuance systems.<sup>95</sup> Machine intelligence OCR can, therefore, help banks reduce cost, errors and processing times while achieving an enhanced customer experience. This article argues that this generation of OCR can contribute significantly to the digitalization of the trade finance process because it does not require any human intervention. It was recognized in the introduction to the initial ICC Guide to the eUCP that '*recent developments in Artificial Intelligence ("AI"), Machine Learning ("ML") and smart Optical Character Recognition ("OCR") are increasingly becoming driving forces behind automation in trade finance*'.<sup>96</sup> The adoption of the eRules has significantly contributed to the use of OCR. While this generation is still in the concept stage, some large global

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<sup>89</sup> Daniel Rasmus, *Rethinking Smart Objects Building Artificial Intelligence with Objects*, 188 (Cambridge University Press 1999).

<sup>90</sup> SWIFT & OPUS Advisory Services International Inc., *Digital Trade and Trade Financing: Embracing and Shaping the Transformation* (2016), [https://www.globaltradecorp.com/media/swift\\_trade\\_digitisation.pdf](https://www.globaltradecorp.com/media/swift_trade_digitisation.pdf).

<sup>91</sup> Asian Development Bank, *Toward Inclusive Access to Trade Finance Lessons from The Trade Finance Gaps, Growth, and Jobs Survey* (2022), <https://www.adb.org/sites/default/files/publication/819856/inclusive-access-trade-finance.pdf>.

<sup>92</sup> Narendra Sahu & Manoj Sonkusare, *A Study on Optical Character Recognition Techniques* 4 IJCSITCE 1, 7 (2017).

<sup>93</sup> SWIFT & Boston Consulting Group, *Digital Innovation in Trade Finance – Have We Reached a Tipping Point?* (2017), <https://www.swift.com/news-events/news/digital-innovation-trade-finance-have-reached-tipping-point>.

<sup>94</sup> HSBC, *HSBC and IBM Develop Cognitive Intelligence Solution to Digitise Global Trade* (2017), <https://www.hsbc.com/news-and-media/media-releases/2017/hsbc-and-ibm-develop-cognitive-intelligence-solution-to-digitise-global-trade>.

<sup>95</sup> Gurwinder Kaur & Tanya Garg, *Machine Learning for Optical Character Recognition System* in Muthukumaran Malarvel et al (eds), *Machine Vision Inspection Systems*, Volume 2, *Machine Learning-Based Approaches* (2nd ed Wiley 2001).

<sup>96</sup> ICC, *Users Guide to the eUCP* (January 2021), <https://2go.iccwbo.org/users-guide-to-the-eucp.html>.

banks are investing in this technology because it could considerably improve operational efficiency and reduce cost-to-serve in trade finance. According to BCG, after implementing OCR, banks have reported achieving up to an 80% reduction in manual validations, and a 70% reduction in data entry.<sup>97</sup>

While OCR offers numerous benefits, there are several legal concerns that need to be considered such as challenges in proving document authenticity, adherence to signature and formatting requirements and data privacy and security issues. For example, since some businesses use third-party OCR service providers, legal considerations related to data privacy and security – especially if personal or sensitive trade-related data is involved – must be addressed to comply with relevant data protection regulations.<sup>98</sup>

### 5.2. *Technologies Designed to Digitalize the Flow of Information in Trade and Trade Finance*

While some serious attempts have been made to digitalize the flow of information in trade and trade finance, they have struggled to reach critical mass. MT798 is arguably the most promising technology in this regard. MT798 messages are used to automate the processing of letters of credit and facilitate the electronic exchange of documents related to trade finance. The use of MT798 reflects the developments in international standards, especially eUCP rules which accommodate the presentation of electronic documents as explained earlier. In trade finance, several bank-to-bank and corporate-to-bank messaging systems allow for the flow of information relating to trade finance transactions such as MT799, MT798 and MT760.<sup>99</sup> MT798, also called “trade envelope”, is a standardized SWIFT messaging protocol for business-to-bank origination from within a client’s enterprise-resource-planning (ERP) system.<sup>100</sup> It reduces process complexity and enables companies to buy from multiple banks comfortably. By eliminating the need for local banks, MT798 could reduce costs and increase banks’ access to new customers and enable corporates to affordably and efficiently access the international SWIFT network.<sup>101</sup>

Despite its potential role in accelerating digitalization, MT798 adoption has been slow for different reasons. First, since trade finance was traditionally viewed as bank intermediation in the trade transaction, banks fear that MT798 might undermine the stickiness of the trade finance business<sup>102</sup> and reduce dependence on bank channels,

<sup>97</sup> SWIFT & Boston Consulting Group, *supra* n.93

<sup>98</sup> Michelle Seng Ah Lee, Jennifer Cobbe, Heleen Janssen and Jatinder Singh, *Defining the Scope of AI ADM System Risk Assessment* in Eleni Kosta, Irene Kamara and Ronald Leenes (eds), *Research Handbook on EU Data Protection Law*, 422 (Edward Elgar Publishing Limited, 2022).

<sup>99</sup> Trade Finance Global, *The Difference Between SWIFT Messaging Types: MT799 and MT760* (2022), <https://www.tradefinanceglobal.com/posts/difference-mt799-mt760/>.

<sup>100</sup> Bernardo Nicoletti, *Procurement Finance: The Digital Revolution in Commercial Banking*, 142 (Springer International Publishing 2018).

<sup>101</sup> SWIFT & OPUS Advisory Services International Inc, *supra* n.90.

<sup>102</sup> Nicoletti, *supra* n.100, at 142.

which might result in reducing customers' willingness to pay for them and devaluing banks' central role in the trade finance sector.<sup>103</sup> Secondly, the complexity and cost of integrating MT798<sup>104</sup> with a corporate's ERP would affect corporates' willingness to invest in this technology.<sup>105</sup>

### 5.3. *Technologies Changing How Trade Finance Operates*

The two most important innovations under this category are BPO and blockchain.

#### *(a) BPO*

Launched in 2013, BPO is a bank-to-bank instrument that relies on the SWIFT communication network.<sup>106</sup> It is a technology-enabled mechanism that provides greater security than open account transaction and also offers greater efficiency than letters of credit, as it removes paper flow and replaces human intervention with a data-matching method.<sup>107</sup> Although the BPO is similar to a letter of credit with regard to the four-corner model (the two contracting parties and their two respective banks), the main difference being that data is matched electronically,<sup>108</sup> which leads to quicker matching.<sup>109</sup> BPO has succeeded more than previous attempts at the digitalization of trade finance, especially in the niche market where the trading parties have prioritized the electronic presentation of data and when there is a high level of trust between trading partners.<sup>110</sup> However, its adoption by banks has been lower than expected for several reasons. First, since BPO is a bank-to-bank instrument, its focus and scope were narrow: it excluded other parties and financial institutions in the trade finance ecosystem.<sup>111</sup> BPO, for example, could not be initiated by the transacting parties. Secondly, in order to employ this instrument, the parties at each end of the transaction must be BPO-enabled.<sup>112</sup> Installing this capability is costly and requires a renovation of well-integrated and long-standing processes. Banks also struggled with the adoption

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<sup>103</sup> SWIFT & Boston Consulting Group, *Working Paper – Embracing Digital in Trade Finance* (2015), <https://www.swift.com/swift-resource/17246/download>.

<sup>104</sup> Stefan Dab et al, *Digital Revolution in Trade Finance* (2016), <https://www.bcg.com/publications/2016/digital-revolution-trade-finance>.

<sup>105</sup> SWIFT & Boston Consulting Group, *supra* n.103.

<sup>106</sup> The first live transaction was announced in 2010; Geoffrey L. Wynne & Hanna Fearn, *The Bank Payment Obligation: Will it Replace the Traditional Letter of Credit – Now, or Ever?*, *Butterworths J. Int'l Banking & Fin. L.*, 102,103 (2014).

<sup>107</sup> Turker Susmus & Ozgur Baslangic, *The New Payment Term BPO and Its Effects on Turkish International Business* 33 *Procedia Econ. & Fin.* t 321, 326 (2015).

<sup>108</sup> David J Hennah, *ICC Guide to the Uniform Rules for Bank Payment Obligations*, 88 (International Chamber of Commerce 2013); Matthew V. Raketti, *The Bank Payment Obligation: A Vehicle for the Electrification of Commercial Letters of Credit?*, *Ann. Rev. Int'l Banking L. & Prac.*, 101, 102 (2016).

<sup>109</sup> Mugasha, *supra* n.42.

<sup>110</sup> Mugasha, *supra* n.9.

<sup>111</sup> *Ibid*; Danuta Marciniak-Neider, *New Form of International Settlements – Bank Payment Obligation* 6 *Acta Universitatis Lodzianis. Folia Oeconomica*, 89, 92 (2015).

<sup>112</sup> SWIFT, *Bank Payment Obligation A New Payment Method* (2016), <https://www.swift.com/swift-resource/35051/download>.

costs of developing new governance, operational expertise and risk management.<sup>113</sup> Thirdly, because BPO did not offer the same security as the documents they intended to replace, banks favoured the familiar instruments such as the letter of credit.<sup>114</sup> Banks also feared losing their fee-rich letters of credit business.<sup>115</sup> Despite its slow market adoption, its broader impact may lie in inspiring other digital innovations such as blockchain. The slow adoption of BPO supports the main argument of this research: in order for the digitalization of international trade finance to gain widespread adoption, all involved parties must be in agreement and participate in the process. This will enable digitalization to achieve a significant level of acceptance and usage.

*(b) Blockchain*

Blockchain was created in 2008 with the introduction of the cryptocurrency Bitcoin.<sup>116</sup> However, it has far broader applications and is being utilized in an increasing number of areas such as trade, banking and trade finance. A blockchain is a digital ledger or database that takes a number of records and puts them in a block.<sup>117</sup> Simply, a block is the data that is added to the ledger after a consensus is achieved.<sup>118</sup> The block cannot be altered once it is added to the chain. When a new block is added to the blockchain, it is timestamped: each block contains a cryptographic hash, a unique cryptographic fingerprint, of the previous block.<sup>119</sup> A blockchain entry is immutable<sup>120</sup> where blocks cannot be deleted or modified (types of blockchain will be discussed in 5.1).<sup>121</sup>

While blockchain and distributed ledger technology (DLT) are often used interchangeably, they are simply different ways of recording data.<sup>122</sup> Strictly speaking, blockchain is one type of DLT. All blockchains are distributed ledgers, but not all

<sup>113</sup> Dab et al, *supra* n.104.

<sup>114</sup> Alexander Malaket, *Financing Trade and International Supply Chains Commerce Across Borders, Finance Across Frontiers*, 136 (Ashgate Publishing Limited 2014).

<sup>115</sup> Mugasha, *supra* n.9.

<sup>116</sup> Colleen Baker & Kevin Werbach, *Blockchain in Financial Services* in Jelena Madir (ed), *Fintech: Law and Regulation*, 148 (Edward Elgar Publishing Limited 2021).

<sup>117</sup> The European Union Blockchain Observatory & Forum (EUBlockchain), *Blockchain in Trade Finance and Supply Chain* (2019), [https://www.eublockchainforum.eu/sites/default/files/report\\_supply\\_chain\\_v1.pdf](https://www.eublockchainforum.eu/sites/default/files/report_supply_chain_v1.pdf).

<sup>118</sup> IOSCO, *IOSCO Research Report on Financial Technologies (Fintech)* (February 2017), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD554.pdf>.

<sup>119</sup> Ravi Sarathy, *Enterprise Strategy for Blockchain: Lessons in Disruption from Fintech, Supply Chains, and Consumer Industries*, 84 (MIT Press 2022).

<sup>120</sup> While blockchain is often perceived as immutable due to its design, it is not entirely immune to changes. Certain situations such as a consensus protocol change, software bugs, or a majority of participants agreeing to modify the blockchain's rules, could potentially lead to changes in the blockchain. While these scenarios are rare and require significant consensus, they illustrate that complete immutability in blockchain is not an absolute guarantee.

<sup>121</sup> EUBlockchain, *supra* n.117.

<sup>122</sup> Yingli Wang, Jand Han, & Paul Davies, *Understanding Blockchain Technology for Future Supply Chains: A Systematic Literature Review and Research Agenda*, *Supply Chain Manag.* 62, 67 (2019).

distributed ledgers are blockchains.<sup>123</sup> A distributed ledger is a database that is consensually shared across networks and is spread across multiple sites, institutions or countries.<sup>124</sup> DLT enables participants to create, distribute and store information securely and efficiently. The networks of the databases can work securely without the need for any central party – third party – that every participant trusts, rather the distributed ledger is collectively maintained by all the participants of that system.<sup>125</sup> To illustrate, each participant is a “node” of the distributed ledger. The nodes are the computers of participants, which each includes a full set of transaction records.<sup>126</sup> Collectively, the nodes participate in building and maintaining the distributed ledger.

Further, one of the most important characteristics of blockchain technology and DLT is the application of smart contracts, which are an ancillary aspect of blockchain. From a process reengineering perspective, blockchain technology facilitates process digitalization and disintermediation via the use of smart contracts. A smart contract is a self-executing software program that automatically executes a function, such as making a payment, on the occurrence of an event.<sup>127</sup> However, there is no clear and accepted legal definition of a smart contract. For instance, smart contracts can be used in insurance claims, where payment is made upon the occurrence of an agreed event. If the flight is delayed by a specific amount of time, the insured will automatically receive payment. The concept of a smart contract was originally proposed by Nick Szabo in 1994 who defined it as ‘*a set of promises, specified in digital form, including protocols within which the parties perform on these promises*’.<sup>128</sup> While smart contracts can exist fully independently of blockchain, the advent of blockchain has enabled smart contracts to come back to the forefront of development and innovation. In the blockchain context, smart contracts are computer codes operating on top of a blockchain including a predefined set of rules under which the parties of that smart contract agree to interact with each other.<sup>129</sup> If the predefined rules are satisfied, the agreement is automatically performed. This implies that the smart contract verifies and enforces the performance of an agreement or transaction automatically without the need for any third trusted party to intervene or trigger an action.

The vital role of blockchain in BPR lies in its ability to create a secure, transparent, and efficient ecosystem for trade finance transactions as will be discussed in the following section.

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<sup>123</sup> Dirk Zetsche and et al, *Liabilities Associated With Distributed Ledgers: A Comparative Analysis* in Jelena Madir (ed), *Fintech: Law and Regulation*, 219 (2<sup>nd</sup> ed Edward Elgar Publishing Limited 2021).

<sup>124</sup> Ibid.

<sup>125</sup> FCA, *Discussion Paper on Distributed Ledger Technology DP 17/3* (2017) available at <https://www.fca.org.uk/publication/discussion/dp17-03.pdf>.

<sup>126</sup> EUBlockchain, *supra* n. 117.

<sup>127</sup> Jelena Madir, *Smart Contracts* in Jelena Madir (ed), *Fintech: Law and Regulation*, 175 (2<sup>nd</sup> ed Edward Elgar Publishing Limited 2021).

<sup>128</sup> Nick Szabo, *Smart Contracts* (1994), <https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>.

<sup>129</sup> Xiaoyu Wang & Fasheng Xu, *The Value of Smart Contract in Trade Finance* (2021), SSRN: <https://ssrn.com/abstract=3777250>.

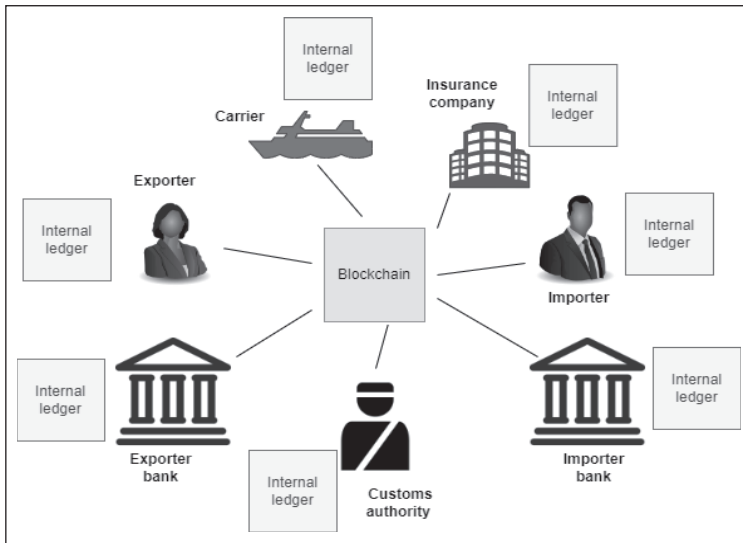


Figure 3. Using blockchain in trade finance

#### 5.4. Blockchain Technology: A Catalyst for Digitalization in International Trade Finance

There is widespread enthusiasm for the potential of blockchain technology's ability to accelerate trade finance digitalization. Blockchain could help catalyse innovation in the trade finance industry by serving as a trustworthy intermediary.<sup>130</sup> It could address the shortcomings mentioned earlier by digitalizing, improving, and shortening the trade finance process. Noumaan Kaleem, for example, opines that '*many banks are looking towards reducing costs and increasing efficiency by replacing the use of paper with technology. With Blockchain, the industry would have the ability to streamline trade finance progress*'.<sup>131</sup> Contrary to the traditional paper-based system, blockchain enables information of all types to be shared at greater speed and more securely.<sup>132</sup> Because shared data is updated across the blockchain network in real-time, each participant has access to the same information at the same time (figure 3). Further, since the ledger is shared across a network of participants, there is no single point of failure and it cannot be hacked from a single server, adding more security to

<sup>130</sup> Hong Kong Applied Science & Technology Research Institute, *Whitepaper On Distributed Ledger Technology* (2016), [https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Whitepaper\\_On\\_Distributed\\_Ledger\\_Technology.pdf](https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Whitepaper_On_Distributed_Ledger_Technology.pdf).

<sup>131</sup> Noumaan Kaleem, *How Blockchain Will Revolutionize Trade Finance* (2019), <https://medium.com/@nakaleem2003/how-blockchain-will-revolutionize-trade-finance-ff519b25a35>.

<sup>132</sup> Takahashi, *supra* n.9.

the participants.<sup>133</sup> Blockchain can also allow trust in digital documents by certifying their accuracy and provenience.<sup>134</sup> Importantly, unlike previous technologies, it can enable expanded access to all trade finance ecosystem players.

In order to understand the vital role of blockchain in digitalizing the end-to-end trade finance process, it is significant to answer an important question about how blockchain is different from previous technologies. As mentioned above, the major difference between blockchain and previous technologies is that blockchain is a decentralized system, and therefore not a standalone technology.<sup>135</sup> Rather, it has the potential to link all of the previous digitalization attempts into one concerted effort to accelerate the digitalization process. The main issue with the previous technologies is that they have been developed separately by different parties to solve specific or one part of the trade finance process, which results in each of these technologies is not fully connected with others, and the trade finance ecosystem players developed and used different systems independently. As noted above, BPO, for instance, is a bank-to-bank instrument, and it excluded other parties in the trade finance ecosystem.<sup>136</sup> As a result, none of the previous technologies gained enough traction to scale. Blockchain has the potential to overcome this, and ultimately allow other digitalization attempts to scale.

There are two types of blockchains: public and private. While public blockchains are maintained by public nodes and are accessible to anyone, only selected nodes can access and make changes to the distributed ledger in private blockchains.<sup>137</sup> This implies that private blockchains restrict access to the blockchain to only those participants that have been admitted into the network. Private blockchains tend to be faster than public versions.<sup>138</sup> Thus, if users need to store a large quantity of data on the blockchain, a public blockchain might not be the best solution. Further, due to restricted access, privacy and data protection are less problematic in private blockchains than in public blockchains.<sup>139</sup> This suggests that private blockchain might be a better option for all parties in trade finance. However, it is significant to mention that while the first blockchain-based trade finance transaction (as will be discussed later in 5.1.2) was completed through a public blockchain (Waves), the second transaction used a private blockchain (Corda). Further, given that new innovations in

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<sup>133</sup> Ganesh Deka & Shiho Kim, *Advanced Applications of Blockchain Technology*, 59 (Springer Singapore 2019).

<sup>134</sup> Nathan Fulmer, *Exploring the Legal Issues of Blockchain Applications* 52 Akron L. Rev. 161, 181 (2018).

<sup>135</sup> Manuela Geranio, *Fintech in the Exchange Industry: Potential for Disruption?* 11 Masaryk U.J.L. & Tech. 245, 250-252 (2017).

<sup>136</sup> Mugasha, *supra* n.9.

<sup>137</sup> Winn, *supra* n.6.

<sup>138</sup> Tanveer Kajla, Vishal Sarin & Sahil Raj, *Blockchain in the Banking Sector: Revolution or Digital Disruption?* in Gagan Kukreja, Pooja Kansra & S. L. Gupta (eds), *Applications, Challenges, and Opportunities of Blockchain Technology in Banking and Insurance*, 154 (IGI Global 2022).

<sup>139</sup> Tyron Neube, Nomusa Dlodlo & Alfredo Terzoli, *Private Blockchain Networks: A Solution for Data Privacy*, IEEE 2nd International Multidisciplinary Information Technology and Engineering Conference (IMITEC)1, 7 (2020).

public blockchains are pushing technical boundaries, this article focuses on both public and private blockchains' potential and challenges.

### 5.5. *Blockchain Challenges*

Although blockchain can potentially link existing technologies, many obstacles currently lie in its way. This research discusses three technical and legal challenges, namely interoperability, scalability, and legal challenges. It is significant to point out that the environmental challenge – which is primarily attributed to the blockchain's high energy consumption – is beyond the scope of this article.

#### (1) *Interoperability*

Interoperability is the capability of computer systems to exchange and utilize information.<sup>140</sup> The distributed nature of blockchain makes this commonly straightforward notion quite complex. Interoperability for blockchains implies that transactions involving parties or assets that belong to different blockchains can be performed as if they belonged to the same blockchain. This raises questions about how blockchains can speak to each other, and how blockchains' interoperability can be achieved. Blockchains may rely on external trusted third-party authorities to verify and confirm transactions or information.<sup>141</sup> However, the integrity of the data depends on the trustworthiness and accuracy of those external authorities. Interoperability could also be achieved by sharing information directly between blockchains without the need for a third-party authority. Application programming interfaces (APIs) which are designed particularly to enable systems to collaborate and communicate with one another might be one solution as they do not need specialized blockchain programming skills to implement.<sup>142</sup> However, APIs do not presume a governance structure, which makes them a poor option for organizing interoperability in the long run. Therefore, the most efficient approach to building interoperability is through the joint effort of creating industry standards that industry networks can accept and converge around.

#### (2) *Scalability*

Scalability refers to how well a blockchain can handle large volumes of transactions at high speeds.<sup>143</sup> Due to the decentralized nature of blockchains, scaling poses challenges that cannot be found in the conventional database technology. To illustrate, blockchains aim at creating decentralized trust through distributed ledgers that are

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<sup>140</sup> EUBlockchain, *supra* n. 117.

<sup>141</sup> World Economic Forum, *Inclusive Deployment of Blockchain for Supply Chains: Part 6 – A Framework for Blockchain Interoperability* (2020), <https://www.weforum.org/whitepapers/inclusive-deployment-of-blockchain-for-supply-chains-part-6-a-framework-for-blockchain-interoperability>.

<sup>142</sup> World Economic Forum, *How Interoperability Establishes Blockchain's Utility and Effectiveness for Trade Finance* (2020), <https://www.weforum.org/agenda/2020/05/blockchain-interoperability-utility-effectiveness/>.

<sup>143</sup> EUBlockchain, *supra* n. 117.



maintained and verified by a community of participants (nodes).<sup>144</sup> The continuously increasing number of nodes has resulted in the blockchain scalability problem. In the case of processing a new transaction, each node adds information related to the transaction in the ledger.<sup>145</sup> The increasing transaction history could fail the overall system. If a blockchain is to be highly performant and decentralized, this will impact security. If it is highly decentralized and secure, scalability will be an issue.<sup>146</sup> Similarly, if a degree of centralization is to be accepted, it is possible to build highly secure and performant blockchains.

### (3) *Legal Challenges*

Blockchain's key attributes pose also challenges to the existing legal and regulatory frameworks. The transition from the centralized system to the decentralized structure presents a challenge from a legal and regulatory perspective and raises enforcement issues.<sup>147</sup> Some tricky legal questions related to the choice of jurisdiction, data protection, privacy compliance, anti-money laundering (AML),<sup>148</sup> and cyber-attacks are still not answered. In a blockchain system, it is important to consider what law might apply to transactions. Since the blockchain's participants – nodes – can span multiple locations around the world, it is often difficult to establish which jurisdictions' laws and regulations are applicable.<sup>149</sup> The issue of privacy and blockchain has also been extremely debated. Data protection and privacy is critical to trade finance parties as business transactions often contain highly sensitive commercial information. Some academic commentators have argued that blockchain is incompatible with privacy laws such as the EU General Data Protection Regulation (GDPR).<sup>150</sup> The immutability of a blockchain system may not be consistent with data protection regulations, which may require that personal data be kept up-to-date and accurate<sup>151</sup> or deleted at the request of the data subject, because once data is stored on a blockchain, it cannot be altered easily, if at all.<sup>152</sup> Given the decentralized nature of blockchain, parties involved should be made fully aware that their personal data is being shared among all the participating parties of the blockchain platform. Even if personal data is permitted to be shared among the involved parties, proper governance should be in place

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<sup>144</sup> Chang, Chen & Wu, *supra* n.12.

<sup>145</sup> Abdurrashid Sanka & Ray Cheung, *A Systematic Review of Blockchain Scalability: Issues, Solutions, Analysis and Future Research* 195 J. Netw. Comput. Appl. 1, 12 (2021).

<sup>146</sup> EUBlockchain, *supra* n. 117.

<sup>147</sup> Fulmer, *supra* n.134; Jeroen Naves et al, *Legal Aspects of Blockchain* 12 Innov. Technol. Gov. Glob 88, 90 (2019).

<sup>148</sup> Jason Chuah, *Money Laundering Considerations in Blockchain-based Maritime Trade and Commerce*, European Journal of Risk Regulation 1, 7 (2022).

<sup>149</sup> The Law Society, *Blockchain: Legal and Regulatory Guidance* (second edition), Section 11: Dispute Resolution (2022), <https://www.lawsociety.org.uk/topics/research/blockchain-legal-and-regulatory-guidance-second-edition>.

<sup>150</sup> *Ibid*, Section 9: Data Protection and Data Security.

<sup>151</sup> General Data Protection Regulation, art 5(1)(d).

<sup>152</sup> *Ibid*, art 5(1)(e).

in order to define the purpose of the collected data and ensure that this data is only used for that purpose.<sup>153</sup>

Another fundamental legal challenge is blockchain governance. Fully leveraging blockchain technology in trade finance requires adopting an appropriate governance structure.<sup>154</sup> In the blockchain context, the main question for regulators is who should be held accountable for breaches of law and regulation. Given the nature of blockchain technology, replicating the current governance system for trade finance operations might not be possible. Current laws and regulations will therefore need to be updated to support the potential transition to the blockchain system.

Blockchain also poses challenges and raises significant concerns from an AML perspective. Unlike transactions through conventional intermediaries such as banks, transactions based on blockchain are decentralized in nature and enable un-intermediated peer-to-peer transactions to happen without any scrutiny. This could pose potential challenges to traditional international AML standards that have focused on regulating and supervising intermediaries.<sup>155</sup>

### 5.6. *How Can Blockchain Be Incorporated into the Trade Finance Process?*

Blockchain could be a potential solution to some of the shortcomings of the documentary trade finance.<sup>156</sup> Thus, it would be useful to examine how blockchain can be incorporated into the letter of credit life cycle. Since blockchain can process transactions in a decentralized way, it would automate the letter of credit process from opening the letter of credit to completion by payment. The assumption in the following example is that all trade finance entities are part of a private blockchain ecosystem. Each player is an equal node in the network and can easily collaborate with each other by specifying the set of documents to be shared among them. The new paradigm could include the following steps:

(1) The importer and exporter sign the sales contract on a specialized contracting platform – if they do not have their own software – as a smart contract, which the importer can automatically transfer its data to the blockchain using API.

(2) The importer (applicant) creates the application for the letter of credit on the blockchain, containing the terms and conditions of the letter of credit and the documents that will be required under this application.

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<sup>153</sup> Ibid, art 5(1)(b).

<sup>154</sup> The Law Society, *supra* n.149.

<sup>155</sup> The Financial Action Task Force, *Opportunities and Challenges of New Technologies for AML/CFT* (July 2021), <https://www.fatf-gafi.org/en/publications/Digitaltransformation/Opportunities-challenges-new-technologies-for-aml-cft.html#:~:text=Opportunities%20and%20Challenges%20of%20New%20Technologies%20for%20AML%2FCFT,-Publication%20details&text=New%20technologies%20can%20improve%20the,more%20accurate%2C%20timely%20and%20comprehensive.>

<sup>156</sup> Takahashi, *supra* n.9.

(3) The issuing bank receives the applicant's request which approves or rejects. It might also make some changes to the draft terms and conditions. If it is approved, it would be ready for issuance to the exporter (beneficiary).

(4) Any other involved banks such as the advising bank or confirming bank can also add their roles and duties.

(5) Once the letter of credit is issued and advised, the exporter can dispatch the cargo.

(6) An electronic bill of lading is issued and shared electronically on the blockchain. The carrier can, for example, use *essDOCS* to issue it.

(7) The beneficiary adds all other electronic trade documents for the presentation on the platform.

(8) Other entities of the ecosystem such as customs authorities, insurance company, tracking and rail firms and others can sign or signify approval by their representative nodes that have access to the private blockchain.

(9) The confirming bank or nominated bank examines the electronic documents to ensure compliance with the letter of credit terms and conditions. However, if there are no intermediary banks the electronic documents would be examined by the issuing bank.

(10) A smart contract would be used to make the payment: if the conditions for payment have been met, this would trigger payment to the beneficiary.

While the entire flow mirrors, to some extent, the traditional letter of credit process, it can be noticed that the applicant no longer completes the preliminary application that the issuing bank would traditionally use to draft the letter of credit. Rather, the applicant will be responsible for drafting the terms of the letter of credit, probably using a standard form provided by its bank and uploads it on the blockchain. However, the issuing bank still plays a crucial role in the process.

It is worth mentioning that blockchain was used in a few trade finance transactions. On 6 September 2016, Barclays reported the first blockchain-based trade finance transaction.<sup>157</sup> The transaction guaranteed the export of almost USD 100,000 worth of cheese and butter between Irish agricultural food co-operative Ornua – formerly the Irish Dairy Board – and the Seychelles Trading Company. The entire process – which usually takes between seven and ten days – was performed in less than four hours. Another transaction was executed in 2018 where the banks HSBC and ING carried out a trade finance transaction via blockchain, for a Cargill shipment of soybeans from Argentina to Malaysia.<sup>158</sup> The whole transaction took less than 24 hours to be completed.

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<sup>157</sup> Reuters, *Barclays Says Conducts First Blockchain-Based Trade-Finance Deal* (2016), <https://www.reuters.com/article/us-banks-barclays-blockchain-idUSKCN11D23B>.

<sup>158</sup> HSBC, *HSBC and ING Execute Groundbreaking Live Trade Finance Transaction on R3's Corda Blockchain Platform* (2018), <https://www.hsbc.com/news-and-media/media-releases/2018/hsbc-trade-blockchain-transaction-press-release#:~:text=HSBC%20and%20ING%20Bank%20have,R3's%20Corda%20scalable%20blockchain%20platform>.

## 6. Accelerating the Digitalization Transformation

Based on the foregoing discussion, the complexity of various legal and jurisdictional requirements combined by the large number of entities involved in trade finance transactions makes trade finance arguably one of the toughest sectors to digitalize. Despite there have been calls to digitalize trade finance since the 1990s – at least – to mirror the general developments in the broader trade, financial services and society generally, the adoption of technological developments has been slow.<sup>159</sup> While many entities recognise and have made some progress to digitalise a slice of the trade finance process, most of these efforts remain fragmented, resulting in only a fraction of the process being truly digitalized. To achieve successful implementation, it is necessary to have the cooperation of all parties involved. However, they are unlikely to bear the cost of adopting innovation unless they are assured that they will be able to connect with their counterparties.<sup>160</sup> Thus, how can the trade finance industry entities be connected faster? In order to accelerate the pace of digitalization, this research suggests that two crucial points should be considered: first, collaboration between the trade finance industry parties, and secondly, removing legal and regulatory uncertainty.

### 6.1. Collaboration between the Trade Finance Ecosystem Parties

Collaboration between banks, corporates, governments, fintechs and other trade finance ecosystem players is crucial in helping digitalization reach critical mass. Since commercial interests are the motive power behind the uptake of digitalization, the industry should tap into the demand for digitalization.<sup>161</sup> To utilize the benefits of digitalization and enhance connectivity, the parties should focus first on the digitalization already happening in the trade finance sector. This raises questions about how the parties are responding to the digital change in the international trade finance.

Historically, the uptake of digitalization by corporates in trade finance has been slow, and this can be clearly seen – as discussed above – with MT798 and BPO. This has been mainly due to banks' conservative approach to new technologies, which in turn has limited demand from corporates.<sup>162</sup> Contrary to banks which are responsible for processing and examining a large number of documents, documentary trade finance is less of an issue for corporates. As a result, they have less incentives to invest in and adopt new technologies. However, corporate are usually willing to invest in solutions that provide time and cost-efficiency, while addressing risk sufficiently.

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<sup>159</sup> In 2019, the rate of main trade finance technologies by treasury professionals was as follows: MT798 (34%), BPO (31%) electronic bill of lading (25%) and blockchain (11%). See Raconteur, 'How will blockchain transform trade finance?' (2020), <https://www.raconteur.net/finance/fintech/trade-finance-blockchain/>.

<sup>160</sup> Mugasha, *supra* n.42.

<sup>161</sup> ICC, *2017 Rethinking Trade & Finance* (2017), <https://iccwbo.org/publication/2017-rethinking-trade-finance/>.

<sup>162</sup> SWIFT & Boston Consulting Group, *supra* n.93.

To reduce costs and enhance efficiency and turnaround times, banks, especially large banks, are investing heavily in technologies that make paper-based trade easier. Some banks for instance are investing in and adopting OCR technology with AI to digitalize manual global trade processes and improve efficiency.<sup>163</sup> Interestingly, the increasing role of fintechs in the trade finance industry and trade generally has played a vital role in encouraging banks to invest in new technologies. To illustrate, fintechs are innovating to compete with banks and other parties. This competition is forcing banks to invest in new solutions to maintain their leading position in the trade finance sector. This competition is one of the main driving forces behind BPR.<sup>164</sup> Some banks, therefore, are investing in or partnering with fintech.<sup>165</sup> A few large banks, for instance, are developing platforms that use blockchain to connect the various parties of the trade finance ecosystem. However, small banks are struggling to compete with fintechs and big banks regarding investment in technology and therefore they are likely to fall behind. Thus, to invest in technology and achieve BPR, small banks can actively cooperate with fintechs.<sup>166</sup>

Customs authorities in many countries are starting to adopt single-window systems which allow international trading parties to submit their documents at a single location.<sup>167</sup> This can significantly drive down the cost and time of dealing with government authorities to obtain the relevant permits to move shipments across borders.<sup>168</sup> The adoption of single-window systems can fundamentally contribute to the end-to-end digitalization because customs authorities can connect to blockchain-enabled platforms through APIs. Before implementing a successful national single-window system, countries need to undertake a public sector equivalent of BPR. This involves integrating various government agencies' processes and technologies into a cohesive and straightforward framework designed to be easy for importers and exporters to understand. Customs authorities are also partnering with tech companies to accelerate digitalization. The International Business Machines Corporation (IBM), a technology company, partnership with Dubai Customs and Dubai Trade to connect key entities using blockchain technology is a good example.<sup>169</sup>

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<sup>163</sup> World Economic Forum, *These 5 Technologies have the Potential to Change Global Trade Forever* (2018), <https://www.weforum.org/agenda/2018/06/from-blockchain-to-mobile-payments-these-technologies-will-disrupt-global-trade/>.

<sup>164</sup> Peter O'Neill & Amrik S. Sohal, *Business Process Reengineering A Review of Recent Literature* 19 *Technovation* 571 574 (1999).

<sup>165</sup> Lars Hornuf et al, *How Do Banks Interact with Fintech Startups?* 57 *Small Bus Econ* 1505, 1510 (2020).

<sup>166</sup> Jinsong Zhao et al, *Riding the FinTech innovation wave: FinTech, Patents and Bank Performance* 122 *Journal of International Money and Finance* 1, 11 (2022).

<sup>167</sup> Jonathan Tsen, *Ten Years of Single Window Implementation: Lessons Learned for the Future* (2011), *Global Trade Facilitation Conference 2011: Connecting International Trade*, [https://unece.org/fileadmin/DAM/trade/Trade\\_Facilitation\\_Forum/BkgrdDocs/TenYearsSingleWindow.pdf](https://unece.org/fileadmin/DAM/trade/Trade_Facilitation_Forum/BkgrdDocs/TenYearsSingleWindow.pdf).

<sup>168</sup> Asian Development Bank, *National Single Window: Guidance Note* (2022), <https://www.adb.org/publications/national-single-window-guidance-note>.

<sup>169</sup> Reuters, *Dubai Government, Companies Team up with IBM on Blockchain Project* (2017), <https://www.reuters.com/article/us-dubai-fintech-idUSKBN15M0RR>.

## 6.2. *Removing Legal and Regulatory Uncertainty*

Technological developments alone are not enough to fully digitalize trade finance as they cannot achieve consensus. They have to work in tandem with the adoption of legal *harmonization* and *standardization*, and this is where supranational initiatives play a pivotal role. Uncertainty around standards, rules, and regulations are all barriers facing the trade finance digitalization journey. The main challenges in trade finance are the legal and regulatory variations among different countries in their treatment of digital records versus paper. This renders the effort towards end-to-end trade finance digitization siloed. Legal harmonization and standardisation are, therefore, crucial to the evolution of digitalization. Any harmonization or standardization initiative must work for all parties involved in the trade finance process and not prioritize the interests of some over others. Here, it is worth mentioning that the success of UCP – which applies to 175 countries around the world – presents a concrete example of the far-reaching positive impacts of an internationally accepted set of standards around the usage of a trade finance product, a letter of credit.<sup>170</sup> The wide adoption of the UCP has ensured a high degree of consistency across jurisdictions and certainty in markets where national rules are not clear or even non-existent.

The reliance on international standards also aligns with the principle of non-discrimination between types of technology by providing a common framework and guidelines that can be applied universally, irrespective of the specific technology employed, ensuring fair and equitable treatment without favouring or excluding any particular technology.

As discussed earlier, the emergence and adoption of new technologies in trade finance and trade generally have led to various standardization and harmonization measures, including, for instance, eUCP, MLETR, eURC, URBPO, the UNCITRAL Convention on electronic commerce, URDTT, and others. Governments need to update their legislations to harmonize their domestic legal frameworks that enable the use of electronic transferable records.

While the supranational initiatives – especially URDTT as examined above – provide a robust legal basis for the digitalization of trade finance, there is still legal uncertainty related to new emerging technologies. Blockchain and smart contracts – for instance – present complex issues of legal certainty (for example, legal liability, know your customer (KYC) and data protection) and enforcement action because they operate across borders. Introducing international standards and rules that address this uncertainty – similar to UCP – would certainly encourage all parties to adopt these technologies, which in turn can accelerate the digitalization journey. Standards are crucial to the success of any developing technology, and blockchain is no exception. The proper standards, set at the right time in a technology's development, can play a key role in ensuring interoperability, boosting trust, and providing ease of use of the

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<sup>170</sup> Galf Calliess & Insa Jarass, *Private Uniform Law & Global Legal Pluralism: The Case of ICC's Incoterms and UCP* (2018) TLI Think! Paper 12/2018, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3184731](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3184731).

technology. In this way, they support its development and establish a pathway to mass adoption.

In that light, it is important to emphasize that the ICC is well-positioned to help the trade finance industry define new rules and standards related to digitalization. While the ICC has led on the standardization of practices the UNCITRAL has led on the harmonization of legislation. The G7 and European Union commitments to develop and promote a framework for the use of electronic transferable records that is compatible with the principles of the MLETR, demonstrate the willingness of the leading trading countries to move to a digital system.<sup>171</sup> Given their large influence and the nature of international trade and trade finance, many countries would likely follow their lead. In June 2017, the ICC Banking Commission launched the “Digitalization in Trade Finance Working Group”, comprising industry leaders from banking, FinTech and corporates, to help accelerate digitalization in trade finance and develop a roadmap for digitalization.<sup>172</sup> The Working Group aims at developing strategies to overcome the obstacles of digitalizing trade finance such as lack of recognition of the legal status of electronic documents; expanding the acceptance of digitalization within the various trade finance parties; and ensuring ICC rules enable digitization.<sup>173</sup>

## 7. Conclusion

This article has examined the digitalization of the end-to-end trade finance process, emphasising that digitalization is a mission for the entire trade finance ecosystem. Although banks are the key player in the ecosystem, transforming the trade finance industry is not their role alone. The involvement of other entities is essential to build critical mass. The end-to-end digitalization is hard when many links in the trade finance chain are not yet digital. They should – therefore – continue to work together to accelerate the transformation journey. As explained in this article, one of the main obstacles to digitalization is the large number of entities and documents involved in executing a single transaction. Thus, there are concerns related to the feasibility of getting all of them on board the digitalization wave. Since financial interests are one of the main driving forces behind the uptake of digitalization, parties know that digitalization is important for the future of the business. However, it is important to understand that the full digitalization is a long journey and should be seen through a medium-term lens. Given that there is clearly a general shift away from paper-based systems to a hybrid ecosystem of paper and electronic documents, all players must learn to thrive in this hybrid system. This will help move to the full digital ecosystem.

Technological developments have led to various standardization and harmonization measures relating to trade finance. This article focused on MLETR and URDTT

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<sup>171</sup> G7, *supra* n.63.

<sup>172</sup> ICC, *ICC Working Group on Digitalisation in Trade Finance* (2018), <https://iccwbo.uk/blogs/press-releases/icc-working-group-on-digitalisation-in-trade-finance>.

<sup>173</sup> The ICC Digital Roadmap, <https://iccwbo.org/publication/icc-digital-roadmap/>.

because they build on previous standardization and harmonization efforts such as UNCITRAL model laws, URBPO and eRules. The paper shows that these supranational initiatives provide a powerful legal basis for technological innovation in trade finance and support the transition to a fully digital trade finance system.

This article demonstrates that while the full digitalization requires employing various technologies, blockchain technology promises to increase collaboration because it can link all the previous digitalization attempts into one concerted effort and can enable expanded access to all trade finance ecosystem entities. However, some obstacles need to be overcome before the promise of blockchain can be realized. Legal questions, for example, related to the choice of jurisdiction, data protection, privacy compliance, anti-money laundering and cyber-attacks are still not answered. Therefore, building universal digital standards – similar to the undisputed legal standing of a letter of credit – that answer these questions, and any legal questions about other technologies, is crucial.