AKADÉMIAI KIADÓ

Using Fintech to protect the strict compliance principle in letter-of-credit law

LE THUC LINH BUI[1,2] and LÁSZLÓ PRIBULA[3*] (ORCID)

[1] Géza Marton Doctoral School of Legal Studies, University of Debrecen, Hungary

[2] University of Economics and Law, VNU-HCM, Vietnam

[3] Department of Civil Procedure Law, Faculty of Law, University of Debrecen, Hungary

ORIGINAL RESEARCH PAPER

ABSTRACT

The focus of this paper is on the uncertainty and controversy associated with the substantial compliance standard as part of the strict compliance principle in the letter of credit law, as well as the possibility of applying new technology to solve such problems. The letter of credit confirms a payment under international sales contracts and contains a promise from the bank to pay the seller if they can present the complying documents as required in the letter of credit. Thanks to the basic principles of a letter of credit, it is stable and trustworthy. Such basic principles as well as the practice of letters of credit are recognized in the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce.

To retain the commercial utility of the letter of credit, the strict compliance principle should be revitalized and consistently applied. However, this principle is not associated with exact standards, which leads to the scenario that courts apply different standards. Such a situation might reduce the commercial utility of letters of credit. Hence, the financial industry is trying to apply new technologies such as blockchain, smart contracts, and the Internet of Things to support the strict compliance principle, and try to reduce the uncertainty related to the substantial compliance standard.

* Corresponding author. E-mail: pribula.laszlo@law.unideb.hu

AK Journals

1. INTRODUCTION

In international trade, exporters and importers normally do not trust each other. Sellers do not want to ship goods before they get paid, and buyers are afraid that they will receive goods of low quality or, in the worst situation, will receive nothing. Hence, in some international transactions, parties will choose a financial instrument – a letter of credit – to support payment progress, since this instrument involves assurance from a third party – a bank. The letter of credit appears to fairly favour both the applicant and the beneficiary.

The strict compliance principle is one of the backbones of the process and protects the commercial utility of the letter of credit. This rule requires the examiners at the respective banks to check and review the documents presented by the beneficiary to detect whether the documents 'on their face' conform to the requirements of the letter of credit.[1] However, this principle causes several problems in terms of application because the parties may have conflicts about the level of strictness. The banks want to strictly follow the strict compliance principle[2] while other parties may believe that a substantial compliance standard is enough.[3] The alternative standards involved with the strict compliance principle lead to numerous options and conflicts. However, due to the development of Fintech, modern technologies such as blockchain, smart contracts, and the Internet of Things (hereinafter referred to as 'IOT') are expected to partly resolve these problems.

This article first provides an overview of the typical letter of credit, including its main governing rules which are specified in the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce. The second part highlights the strict compliance rule and its substantial compliance standard, as well as explains the reason why controversy associated with the substantial strict compliance standard could convert inexpensive and efficient letters of credit into expensive and clumsy ones. The third part gives a brief introduction to the blockchain, smart contracts, and IOT used in Fintech these days. In the final part, the author proposes an alternative way of using blockchain, smart contracts, and IOT in the process of employing letters of credit and tests whether applying such new technologies could support the strict compliance rule.

2. THE TYPICAL LETTER OF CREDIT

2.1. The general features of letters of credit

Letters of Credit have been known for a few centuries.[4] In their original form, letters of credit involved two parties; a wealthy party promised to pay another party an amount of money through a letter. In exchange, the other party would ship goods to the agent of the aforesaid wealthy party.[5] Merchants at that time used letters of credit among themselves and letters of credit were supported through the networks of merchants.[6]

---

[1] UCP 600 (2007) Article 14(a).

[2] Courtaulds No. Am., Inc. v. North Carolina Nat. Bank (1975).

[3] Grassi (1995) 116.

[4] Trimble (1948) 981 and Miller (1959) 162–66 state that letters of credit have been used since the twelfth century.

[5] Miller (1959) 162–63.

[6] De Malynes (1622) cited in Miller (1959) 163.

Since business grew in scale, along with the size of international transactions, the network of merchants was not sufficient to guarantee the credit of an individual buyer.[7] Hence, merchants needed an independent party – normally a bank – to secure the payment between the seller and their unknown or remote buyer.[8] Accordingly, a third party was adjoined to modern letters of credit. The essential function of letters of credit stayed the same: to provide a guaranteed mechanism for payment associated with a sales transaction.[9]

The letter of credit is a kind of documentary transaction that involves credit from the bank, which payment obligation is triggered once the letter of credit is delivered.[10] The letter of credit takes two forms, which are the commercial letter of credit, and the standby letter of credit. Within this article, the author only addresses commercial letters of credit.[11]

The commercial letter of credit is a written promise by a bank to a seller in which the bank states they will honour the tendered documents of the beneficiary if the documents on their face comply with the terms and conditions defined in the letter of credit.[12] The buyer must clearly instruct the bank about their preconditions in the letter of credit. In this letter of credit, the bank promises to pay the seller an agreed amount of money if the beneficiary constitutes a complying presentation.[13] From the perspective of the beneficiary, the issuing bank places itself in the position of its customer and commits to paying the beneficiary the purchase price.[14] Once the beneficiary receives the announcement from the bank that it has issued the letter of credit, the seller knows that they will get paid when they submit the documents that comply with the requirements of the letter of credit.[15]

Based on the level of faith among the parties, the commercial letter of credit may be one of two forms: irrevocable credit,[16] in which security is provided at the highest level to the beneficiary, and revocable credit,[17] which does not involve any specified kind of security.

---

[7] Leon (1986) 433.

[8] Leon (1986) 433.

[9] Leon (1986) 433.

[10] Grassi (1995) 84.

[11] Both the commercial and standby letter of credit are processed based on documents; however, standby credit has a different capacity to the commercial one. Earlier in this paper, the author mentioned that the main areas of focus of this article are the strict compliance principle and examining the possibility of applying the new technology to solving conflicts regarding the application of the substantial compliance standard. Such problems usually happen with the commercial letter of credit because it requires a set of different documents and these documents are more complicated than the documents needed for the standby one. Standby credit is mostly used to provide a guarantee of the performance of the buyer to the seller. Hence, the scope of this paper only covers commercial credit.

[12] Grassi (1995) 90.

[13] UCP 600 (2007) Article 7.

[14] Grassi (1995) 90.

[15] Grassi (1995) 90.

[16] The issuer will commit itself irrevocably to comply with the credit and honour the facially conform documents presented by the beneficiary. This irrevocable letter of credit cannot be cancelled during a specified period.

[17] The revocable letter of credit can be cancelled or amended at any time without announcement before payment. This kind of credit provides no security and is very flexible, to the advantage of the buyer. The seller who accepts revocable credit has trust in the buyer and the bank.

2.2. Parties to a letter of credit, and three contracts

As has been stated above, the letter of credit will be issued by the issuing bank once the buyer and the seller enter into a sales contract that states that the seller will receive their payment through a letter of credit.[18] The bank of the buyer will be asked to issue a letter of credit in favour of the seller promising to honour the documents presented by the seller if the documents comply with the requirements defined in the letter of credit. Once the bank fulfils its obligations, the buyer will reimburse the bank, collect the documents, and receive the goods.[19]

Under the terms of the letter of credit, the buyer is known as 'the customer' or 'the applicant', the bank is known as 'the issuer', and the seller is known as 'the beneficiary'.[20] The three parties create three sets of obligations, as follows:

  (i) The sales agreement between buyer and seller is known as the underlying contract. This agreement is independent of the letter of credit, even though this contract calls for a letter of credit;[21]
 (ii) The application to open the letter of credit between the issuer and their customer;[22]
(iii) The letter of credit, which is the assurance of the issuing bank, by which it promises to pay against the documents conform on their face to the requirements under this letter.[23]

2.3. Governing law

Uniform Customs and Practice for Documentary Credits published by the International Chamber of Commerce is considered the most successful 'set of private rules' that governs and deals with letters of credit.[24] There is another source of law that needs consideration – Article 5 of the Uniform Commercial Code of the United States,[25] which should be referred to.

- The Uniform Customs and Practice for Documentary Credits:

Uniform Customs and Practice (hereinafter referred to as 'UPC') is a set of uniform standards for letters of credit defined by the International Chamber of Commerce (hereinafter referred to as 'ICC'). The first version of the UCP was completed in 1933[26] and the ICC has repeatedly improved the UCP since then. The latest version of UCP is known as UCP 600 and became valid on 1 July 2007.[27] The UCP is found to be helpful in interpreting the

---

[18]Grassi (1995) 90.

[19]Leon (1986) 433; UCP 600 (2007) Article 7.

[20]UCP 600 (2007).

[21]Leon (1986) 434.

[22]Leon (1986) 434.

[23]UCP 600 (2007) Article 2.

[24]See Introduction of UCP 600 (2007).

[25]Leon (1986) 438.

[26]International Chamber of Commercial (1933) ICC brochure No. 82; Ellinger (1984) 578–79.

[27]UCP 600 (2007).

mechanism of the letter of credit by the courts since they consider it as evidence of international customs.[28]

The UCP harmonizes international practices among merchants into written rules and addresses the new development in the banking, insurance, and transport industry.[29] However, the UCP is still not considered a law, even though it is accepted generally among countries. To some scholars, UCP might be seen as de facto law.[30]

- The Uniform Commercial Code of the United States

Article 5 of the Uniform Commercial Code (hereinafter referred to as 'UCC') is drafted to 'deal with some but not all of the rules and concepts of letters of credit as such rules or concepts have developed prior to [the U.C.C] or may hereafter develop'.[31] It is also recommended that, since Article 5 does not cover the whole applicable law, it should always be checked because if it does specifically cover the relevant issue and if it applies to the transaction it will supersede any contrary law.[32] Even though Article 5 of UCC did not totally cover all 'rules and concepts', it is still considered fundamental for development in the future.[33]

In 1995, Article 5 was revised due to 'weaknesses, gaps, and errors in the original statute which compromise its relevance'.[34] The Revised Article 5 of UCC was also drafted with considerable sections and subsections annotated with the words 'unless otherwise agreed';[35] consequently, parties covered under the letter of credit can outline their letters of credit to fit their agreement.[36] As is often the case, the UCC is not uniform, hence there are exceptions to it and adjudgments in the versions of different states.[37]

3. THE STRICT COMPLIANCE PRINCIPLE

3.1. Overview of the strict compliance principle

'There is no room for documents which are almost the same, or which will do just as well'. This statement expresses the point of view of Viscount Summer and the courts in general[38] about the strict compliance principle. According to this principle, the document examiners of the bank will check and revise such documents as are submitted to determine whether these documents

---

[28]This case Consolidated Aluminum Corp. v. Bank of Virginia (1982) uses UCP as evidence of custom and usage.

[29]See Introduction of UCP 600 (2007).

[30]Ellinger (1984) 578.

[31]Uniform of Commercial Code (1952), Article 5, Section 5–102.

[32]Uzzelle (1985) 51.

[33]Task Force (1990) 1532.

[34]Task Force (1990) 1532.

[35]Uniform of Commercial Code (1995).

[36]Leon (1986) 439.

[37]Uzzelle (1985) 51.

[38]Equitable Trust Co. of New York v. Dawson Partners, Ltd. (1927)

comply 'on their face' with the requirements defined according to the letter of credit.[39] If the documents meet the requirements, the bank will honour them, and otherwise not.[40] The bank is under no duty to look beyond the presented documents.[41] This principle is supported by the UCC[42] and the UCP.[43]

Under the strict compliance principle, the bank clearly understands that it must check the documents regarding whether they comply on their face with the requirements of the letter[44] and will not be responsible for any lack of awareness regarding the trade performance of the agreement. The UCP also stresses that such credit is autonomous from the sales agreement in which the letter is formed.[45] In this process, the text in the submitted documents are treated like 'a mere combination of letters'[46] without any meaning. A document is accepted only if it contains the same words as required under the letter of credit; this practice demands no interpretation and expects the words in the documents to be similar.[47] Only the strict 'word to word' method is accepted in relation to letters of credit.[48] Even though this approach has been proven to be too severe, and the beneficiary might think it is too unfair,[49] it balances between security for parties and the efficiency of letters of credit.[50]

The strict compliance principle requires the beneficiary to submit the complying documents and the bank to fulfil its payment obligation once the presented documents conform to the standards in the letter of credit.[51] The buyer needs to precisely specify what kinds of documents he needs to prove his possession of the goods from the seller.[52] This negotiation between parties does not involve the bank and puts the applicant in a strong position since the beneficiary might find himself stuck in a situation in which he must submit unavailable documents or accepts non-documentary conditions if he does not pay attention to the requirements defined in the letter of credit.[53] However, the bank's customer – the buyer – also needs to be well prepared since he will pay for goods that he is unable to examine before the money is transferred.[54]

---

[39]UCP 600 (2007) Article 14(a).

[40]Dolan (1985) 20.

[41]Dolan (1985) 20.

[42]Uniform of Commercial Code (1952) Article 5; Uniform of Commercial Code (1995) Article 5.

[43]UCP 600 (2007).

[44]UCP 600 (2007) Article 14; UCP 600 (2007) Article 15; UCP 600 (2007) Article 16.

[45]UCP 600 (2007) Article 4.

[46]Grassi (1995) 112.

[47]Grassi (1995) 112.

[48]Equitable Trust Co. of New York v. Dawson Partners, Ltd. (1927).

[49]Dolan (1996) 604.

[50]Dolan (1996) 603.

[51]Dolan (1985) 21–22.

[52]Grassi (1995) 112–13.

[53]Grassi (1995) 113.

[54]Grassi (1995) 113.

According to the strict compliance principle, the agreement between the parties may not be restructured.[55] The beneficiary cannot even argue that he cannot fulfil his duty in the letter of credit because one of the documents that he needs to submit to the bank must be taken from the buyer since the beneficiary has accepted such a requirement under the letter of credit.[56] Once the beneficiary accepts the terms, they should follow them. The beneficiary is 'trapped' with the deal since 'it is black letter law that the terms and conditions of a letter of credit must be strictly adhered to'.[57]

3.2. The substantial compliance standard

The judgement of *Fidelity Nat'l Bank v. Dade County* stated that: 'Compliance with the terms of a letter of credit is not like pitching horseshoes. No point is awarded for being close'.[58]

This statement somehow shows that some courts apply the absolute strict standard without bargaining. Consequently, the buyer may choose not to fulfil their payment obligation if the documents submitted by the beneficiary fail to comply.[59] Some studies have proposed other ways to avoid the inequity associated with the strict compliance rule,[60] although they cannot satisfy the standards even if they are generally adopted in practice.[61]

Without codified guidance, most courts will normally understand the strict compliance principle of letters of credit as the documents must comply word by word with requirements which are stipulated in the credit.[62] This rule requires the issuer to verify the presented documents according to 'both literal and exacting' ways.[63] Taking another perspective, in the case *U.S Industries v. Second New Haven Bank* the District Court decided that the presented documents had rigidly complied with the preconditions of the credit letter, even though the customer had required certification proving payment.[64] The court held that the strict compliance principle should only be applied if a 'fatal' difference was found in the documents.[65] It is assumed that 'almost the same or… just as well'[66] is thus acceptable.[67]

---

[55]Grassi (1995) 113.

[56]Grassi (1995) 113

[57]Corporacion De Mercadeo Agricola v. Mellon Bank Int'l (1979).

[58]Fidelity Nat'l Bank v. Dade County (1979).

[59]AMF Head Sports Wear, Inc. v. Ray Scott's All-Am. Sports Club (1978).

[60]Thier (1982) 875.

[61]Fama (1985) is of the opinion that the case Bank of Canton v. Republic Nat'l Bank of N.Y. made it the duty of banks to notify the beneficiary of the discrepancy, and to allow them to remedy defects in the documents. This approach receives some support from the courts but remains other problems such as the period for giving notice.

[62]Thier (1982) 862.

[63]Courtaulds No. Am., Inc. v. North Carolina Nat. Bank (1975).

[64]U.S Industries v. Second New Haven Bank (1978).

[65]U.S Industries v. Second New Haven Bank (1978).

[66]Equitable Trust Co. of New York v. Dawson Partners, Ltd. (1927).

[67]In case *Corporacion de Mercadeo Agricola v. Mellon Bank Int'l,* the court stated that the document must comply with the *essential* requirements of the letter of credit; the court in the case *Banco Espanol de Credito v. State Street Bank & Trust Co.*, stated that the documents must 'conform […] in all significant respects'.

The theory of the substantial compliance standard is established based on the equity principle.[68] According to this standard, the conditions of the letter of credit are deemed to be met when a document is presented even if this document does not conform in every formal aspect.[69] The court that chooses the substantial compliance standard states that what they are doing is 'fair'.[70] This means that the bank is allowed to overlook minor technical differences in documents.[71] Other courts express that the reason they choose the substantial compliance standard is that the bank may only be 'bargaining with justice'[72] and niggling about 'hypertechnical arguments'[73] contained in the documents of the beneficiary – consequently, courts may follow their sense of 'what is fair'[74] and apply the substantial compliance standard.[75]

There have been several criticisms about the findings of courts regarding the use of the substantial compliance standard.[76] This discretionary determination is considered a threat to the certainty of the letter of credit and can prevent the participation of banks in these kinds of services. This substantial compliance standard has lessened the effectiveness of the letter of credit and increased the time to examine the documents of banks, as well as deterring banks from achieving their original goals with the letter of credit.[77]

The issuer may also be discouraged by the courts since the courts keep granting judgments that ask the issuing banks to waive terms which are believed by the courts to be unimportant.[78] To some commentators, a waiver for documentary noncompliance of the issuer in fact is an implied term in the contract between the issuer and its customer so the waiver of documentary noncompliance is acceptable as long as the issuer has good faith.[79] This point of view is contrary to the custom of trade in the banking industry, which only accept the strict compliance principle.[80]

The strict compliance principle is considered the essential rule in letters of credit; however, courts always combine this rule with other principles from contract law, equity law, and banking.[81] These kinds of interactions soften the rigidity of the strict compliance rule; however, their application leads to a situation whereby compliance with documents is related to

---

[68]Grassi (1995) 115.

[69]Grassi (1995) 115.

[70]Mahon v. Stowers (1974).

[71]Banco Espanol De Credito v. State Street Bank & Trust Co. (1967).

[72]Crocker Commercial Services v. Countryside Bank (1981).

[73]Crocker Commercial Services v. Countryside Bank (1981).

[74]Mahon v. Stowers (1974).

[75]Dolan (1985) 25.

[76]Grassi (1995) 116.

[77]Dolan (1996) 602, 605; Thier (1982) 855–56; Fama (1985).

[78]Kolyer (1980) 152–53.

[79]Anderson (1961) 394.

[80]UCP 600 (2007).

[81]McLaughlin (1989b) 5.

substantial compliance and no longer looks like strict compliance.[82] This conduct may severely affect the drafting of letters of credit and how they are enforced.[83]

3.3. Justification for the strict compliance principle

Letters of credit are expected to perform several functions. They can reflect the needs of parties and protect the interests of the issuer.[84] Noteworthily, letters of credit provide applicants with protection that other kinds of payment may lack.[85] The parties in the letter of credit are informed that the documents will be honoured if they comply; otherwise, they will not.[86]

These functions of letters of credit are maintained due to the strict compliance principle. The document examiners of the bank will review the content of the presented documents and compare every single word with the terms of credit.[87] These examiners know the banking customs and usages since they are banking experts.[88] The strict compliance principle also helps to review content quickly and reduces expenses.[89] It is unworkable to ask the bankers to examine the quality of the goods being traded or verify the information contained in the documents or what invoices have been provided for.[90] To answer these questions, bankers must be schooled in the industry associated with the goods being purchased; in other words, they must be 'a nisi prius judges'.[91] The process of the letter of credit will last forever if the bankers must investigate these questions. Furthermore, the main purpose of letters of credit will be destroyed. Such an approach would work against the entire endeavour of protecting the bank because the obligation of the issuer is only to evaluate the documents facially for compliance with the terms of the letter of credit.[92]

The courts make a mistake if they consider that the 'substantial performance of a contract' is equal to 'substantial compliance standard under a letter of credit.'[93] This problem happens since the courts regard letters of credit as contracts and apply the law of contract to the letter of credit.[94] It is not encouraging that the doctrine of contract law is applied to the law of the letter of credit.[95] The strict compliance principle is designed to stop unscrupulous persons from taking advantage of the letter of credit and violating the integrity of the process.[96]

---

[82]McLaughlin (1989b) 5; Thier (1982) 855.

[83]McLaughlin (1989b) 5.

[84]Leon (1986) 439.

[85]Dolan (1985) 26.

[86]Dolan (1985) 26; Grassi (1995) 115; Leon (1986) 439; UCP 600 (2007).

[87]Dolan (1985) 27.

[88]McLaughlin (2002) 522.

[89]Dolan (1985) 27.

[90]Dolan (1985) 28.

[91]Dolan (1985) 28. '*Nisi prius*' is a Latin word which means 'unless first'. A court nisi prius means 'court of original jurisdiction', as distinguished from a court of appeals.

[92]Dolan (1985) 28.

[93]Thier (1982) 863.

[94]Flagship Cruises, Ltd. v. New England Merchants Nat'l Bank of Boston (1978); Crocker Commercial Services v. Countryside Bank (1981); U.S Industries v. Second New Haven Bank (1978).

[95]Thier (1982) 863.

[96]Hadden v. Consolidated Edison Co. (1974)

The frequency of litigation in letter-of-credit cases related to the compliance of documents proves the opinion that the stability of the letter-of-credit is threatened because of the substantial compliance standard.[97] The certainty of the letter of credit results from the strict compliance principle.[98] In contrast, the substantial compliance standard allows the issuer to have discretion; which means the issuer now must determine whether the compliance under the ambiguous standard of 'almost as good' is good enough.[99] The courts expect the issuer to act as a judge to evaluate the documents presented by the beneficiary in a short time,[100] and the issuer must choose between being claimed for wrongful dishonour by the beneficiary or being denied the reimbursement by the applicant.[101] This conduct weakens the strict compliance principle.[102] The main purpose of the letter of credit is to guarantee that the beneficiary gets paid and such uncertain conduct frustrates that purpose.[103]

In other words, the substantial compliance standard means no standards for the strict compliance principle. This invites uncertainty and controversy and promotes disputes. It converts inexpensive and efficient letters of credit into expensive and clumsy ones.[104] Hence, the financial industry has been trying to find an alternative way to solve the problems caused by the substantial compliance standard while maintaining the commercial utility of the letter of credit.

4. BLOCKCHAIN, SMART CONTRACTS, AND IOT

In commercial credit, the buyer needs several documents to obtain his goods. Hence, the chance that documents contain discrepancies is quite high.[105] This problem has led to conflicts over the use of the substantial compliance standard for years. The banking industry considers that this standard threatens the stability of letters of credit. In contrast, courts imply that banks are just bargaining with justice.[106] Therefore, the financial industry always tries to figure out new methods to reduce such discrepancies and protect the strict compliance principle. The latter are being inspired to rejuvenate traditional letters of credit by Fintech, which could help assure transparency and reduce the discrepancies in documents used in transactions using blockchain

[97] Flagship Cruises, Ltd. v. New England Merchants Nat'l Bank of Boston, (1978); Banco Espanol De Credito v. State Street Bank & Trust Co. (1967); Crocker Commercial Services v. Countryside Bank (1981); New York Life Ins. v. Hartford Nat. Bank Trust (1977).

[98] Kozolchyk (1980) 15.

[99] Insurance Co. of North America v. Heritage Bank (1979).

[100] Banco Espanol De Credito v. State Street Bank & Trust Co. (1967).

[101] Chase Manhattan Bank v. Equibank. (1977).

[102] Thier (1982) 867.

[103] Insurance Co. of North America v. Heritage Bank (1979).

[104] Dolan (1985) 28.

[105] UCP 600 (2007). The Introduction of UCP 600 states that 'When work on the revision started, a number of global surveys indicated that, because of discrepancies, approximately 70% of documents presented under letters of credit were being rejected on first presentation'. Mann (2000) 2495 shows that in an interview with bankers, there were claims that presenters 'do not present documents that conform to the requirements of the letter of credit'.

[106] Crocker Commercial Services v. Countryside Bank (1981).

and smart contracts.[107] Other technological solutions such as IOT are also used in logistics in business, such as in supply chains.[108]

4.1. Fintech overview and trade finance

Fintech[109] brings new technologies into banking and other financial industries.[110] In contrast to the common opinion that FinTech is new, the financial industry has been using it for years.[111] In 2008, the global financial crisis happened, which was considered a big event for FinTech.[112] At that time, the trust of consumers in the banking industry severely declined,[113] along with international trade.[114] Since then, banks have been investigating how to invigorate trade finance among international buyers and sellers.[115] According to one estimation, savings of up to $50 million per year are possible due to paperless documents.[116] Furthermore, competition among international banks will increase due to the digitization of trade.[117]

4.2. Blockchain and smart contracts

Fintech, particularly blockchain and smart contracts, is encouraging the banking industry to modernize credit.[118] However, blockchain and smart contracts have been part of the debate among governments[119] and the financial industry for years.[120] Still, these technologies are expected to upgrade essential tasks such as documentary review and payments associated with trade.[121]

---

[107]Lehmacher and Mcwaters (2017). The article states that '[b]lockchain technology can in fact provide the backbone of a system of authorized trusted participants, bringing everything into the light, whether it is a product, the party selling it or the path it takes to reach the buyer'.

[108]Department of Commerce Internet Policy of Task Force & Digital Economy Leadership Team (2017).

[109]Fintech or 'Financial technology' refers to the adoption of new technologies to deliver financial solutions. It involves a special 'marriage' between financial services and information technology. The original term Fintech may have first appeared in the early 1900s in a project by Citigroup named the 'Financial Services technology Consortium'. See more Hochstein (2015).

[110]Arner, Barberis and Buckley (2016) 1271–72.

[111]Arner, Barberis and Buckley (2016) 1272–74.

[112]Arner, Barberis and Buckley (2016) 1286. Fintech is considered to have entered its 3.0 era since 2008, and to have shifted the mindset from the idea of a retail customer to one 'who has the resources and legitimacy to provide financial services'.

[113]Arner, Barberis and Buckley (2016) 1287–88.

[114]Hennah and Jarrold (2017) 226.

[115]Hennah and Jarrold (2017) 226.

[116]Hennah and Jarrold (2017) 227.

[117]Hennah and Jarrold (2017) 226–27.

[118]Lehmacher and Mcwaters (2017). An explanation that blockchain could 'bring everything to light', reducing discrepancies in documents associated with letters of credit.

[119]Stanley (2017).

[120]PwC (2017) explains that more companies have tried to embed blockchain technology into their systems since blockchain has become familiar.

[121]Wass (2017) explains that three international banks are trying to transfer electronic documents using technologies that use CGI.

4.2.1. *Blockchain.* Blockchain is defined as

> a distributed, shared, encrypted-database that serves as an irreversible and incorruptible public repository of information. It enables, for the first time, unrelated people to reach consensus on the occurrence of a particular transaction or event without the need for a controlling authority.[122]

In short, blockchain is considered to provide a 'hash function and encryption'[123] for information with a guarantee which has never been seen before.[124]

Blockchain technology is preferably known as 'distributed ledger technology' ('DLT')[125] or 'consensus ledger' technology.[126] Transactions are combined into a 'block' and each block is verified by a network of computers.[127] After authentication, the block will be added to the 'chain' of previous transactions. These processes use cryptographic techniques and require a huge number of computers.[128] There are two types of blockchain: permissionless (public), and permissioned (private).[129] Permissionless blockchain allows any peer to join and leave the network as a reader and writer at any time. In contrast, permissioned blockchain only allows a limited number of readers and writers.[130]

One of the essential elements of blockchain is decentralization, which means no individual or entity can fully control the blockchain.[131] When a member amends the ledger,[132] every computer checks the transaction via a process of 'consensus' before the blockchain is updated with the alteration.[133] These changes are considered additions to the current blocks;[134] hence, the blockchain is often mistaken as 'immutable'.[135] These functions of the blockchain have attracted the attention of the banking industry and the financial industry.[136] Blockchains are also considered 'trustless' because of their high level of transparency.[137]

---

[122]Wright and Filippi (2015) 2.

[123]A hash function gathers a key (which is a 'group of characters') and maps it into a value of a certain length. Such a length is called a hash value and represents the original strings of characters but at a smaller size. See more at link1. 'Encryption' is a process by which information is translated into a secret code in which the original meaning of the information is hidden. It requires special equipment to understand. See more at link2 and link3.

[124]Trautman and Molesky (2019) 239–40.

[125]Pinna and Ruttenberg (2016).

[126]Pinna and Ruttenberg, (2016) 9. This explains that the other DLTs 'do not keep track of the history of transactions but instead operate on the basis of consensus reached on a ledger of accounts, which are updated with new transactions at each validation round'.

[127]Each computer in the blockchain is known as node.

[128]Lanchester (2016); O'Shields (2017) 180.

[129]Trautman and Molesky (2019) 246.

[130]Trautman and Molesky (2019) 246.

[131]Perry (2017). Each computer (or 'node') connects to the same peer-to-peer network that runs under the same rules.

[132]Shackelford and Myers (2017); Mougayar (2016).

[133]Wright and Filippi (2015) 5. Without blockchain, independent entities are needed to verify the information.

[134]The changes are added to the current blocks, but the original versions of blocks remain unaltered.

[135]Bellamy and Hill (2016); Tapscott and Tapscott (2016) 7.

[136]Shen (2017). Wright and Filippi (2015) 10–11. It is considered that two of the biggest benefits of the use of blockchain are data management and better transparency.

[137]Walch (2017) 722 explains that anyone can inspect blockchain, but 'with no single user control'.

For such reasons, document management could be improved by blockchain.[138] The process verifies the documents and stores them on the blockchain.[139] International trade is known for using numerous documents and processes with multiple phrases in correspondence, and blockchain would be an easier way to collect, organize, and justify such documents.[140] Furthermore, international transactions could be automated due to a combination of blockchain and smart contracts.[141]

4.2.2. Smart contracts. In 2006, Nick Szabo first mentioned the term 'smart contracts'.[142] At the basic level, smart contracts are logic statements recorded by code run on blockchain.[143] Smart contracts are drafted through computer code and are considered 'self-executing electronic instructions'.[144] The 'smartness' of the contracts comes from the conduct of the computers which can 'read' the contract and execute the guidance.[145] Applications for smart contracts have existed for years in the industry, such as in the processing systems of financial institutions which estimate regular payments[146] and in day-to-day life such as in vending machines.[147]

Smart contracts are fully exploited due to the security and precision provided by blockchain technology.[148] In international trade, smart contracts can be used to facilitate payments or have other functions.[149] A smart contract will be 'signed' by parties and redistributed on blockchain.[150] The program will trigger activities only once conditions are met,[151] without the participation of intermediaries such as middlemen or an invoice.[152] The technology of blockchain and smart contracts have further potential use in financial instruments such as letters of credit.[153] Such a combination might change the traditional function of letters of credit.[154] Another key technology that promises to change the performance of the financial industry is IOT.[155]

---

[138]HSBC (2021). Explains that HSBC China used Voltron, a shared blockchain platform, to issue a letter of credit in favour of MTC.

[139]Shome (2017). Explains how the application Wave is used for a transaction involving a letter of credit.

[140]MAREX (2017). Explains how a 'Smart Bill of Lading' could be generated by sensors collecting data.

[141]O'Shields (2017) 181–82.

[142]Tapscott and Tapscott (2016) 101; Chamber of Digital Commerce (2016) 8.

[143]Lewis (2016).

[144]Bourque and Fung Ling Tsui (2014); O'Shields (2017) 179.

[145]Bourque and Fung Ling Tsui (2014); O'Shields (2017) 179.

[146]Mendelowitz and Brammertz (2016).

[147]Chamber of Digital Commerce (2016) 3.

[148]Institute of International Finance (2016).

[149]De Sevres, Chilton and Cohen (2016).

[150]Institute of International Finance (2016).

[151]O'Shields (2017) 179.

[152]Hughes (2018).

[153]Elsaid (2022) explains that there is a project that uses blockchain to register trade-related finance transactions between Standard Chartered and more than twelve other banks.

[154]PYMNTS (2017). IBM's James Wallis has mentioned the lack of transparency between traders. Hence, blockchain with its 'transparency' might help to solve such problem.

[155]Eckenrode (2015).

4.2.3. *IOT and IOE.* The methods which people use to communicate and search for information have changed throughout the years due to the internet.[156] However, the connection between physical objects is still considered low.[157] Hence, the Internet of Things could be deployed in mainstream applications due to the foundation created by the capacity of the blockchain to control various data from several sources.[158]

The financial industry started to exploit the advantages of IOT from its early stages[159] along with other technologies such as radio-frequency identification ('RFID').[160] Other technologies such as sensors or oracles[161] undertake complementary jobs to convert the 'Internet of Things' to the 'Internet of Everything' ('IOE').[162]

4.2.4. *The definition of IOT and IOE.* The Internet of Things is normally described as 'devices that connect to the Internet'.[163] Ordinarily, IOT could be understood as a 'physical object'[164] that adopts technology to connect in real-time with devices or their surrounding environment.[165] There are some suggestions that IOT should not be limited to any fixed definition since this might retard its growth.[166]

IOE is an expansion of IOT.[167] IOE is formed from four elements, which are 'people, processes, data, and things'.[168] The IOE involves more than just linking devices on the internet; it is expected to create value from its elements.[169]

4.2.5. *Sensors and oracles.* Sensors are embedded in physical objects and link these objects to IOT.[170] These sensors capture information around physical objects and information about those who own the objects as well.[171] Sensors are normally used to collect information about weather,[172]

---

[156]Want, Schilit and Jenson (2015).

[157]Bradley, Barbier and Handler (2013) stated that 99.4 percent of physical objects that may one day be part of the Internet of Everything are still unconnected.

[158]Wright and Filippi (2015) 14.

[159]Paez and Marca (2016).

[160]Economic Intelligence Unit (2013).

[161]Roy and Chowdhury (2017).

[162]Evans (2013).

[163]Larson (2018) 966; Department of Commerce Internet Policy of Task Force & Digital Economy Leadership Team (2017) 6.

[164]Larson (2018) 966.

[165]Paez and Marca (2016) 31.

[166]The Department of Commerce Internet Policy of Task Force & Digital Economy Leadership Team (2017) 5. They share the same view 'that emphasize[s] the need to allow the IoT environment to grow without the restrictions of labels or specific definitions that could inadvertently limit the applications, innovations, and overall potential of IoT'.

[167]Evans (2013) states that the Internet of Thing is just 'one of four dimensions-people, process, data, and things-we talk about on the Internet of Everything.'

[168]Evans (2013); Wright and Filippi (2015) 15.

[169]Evans (2013); Wright and Filippi (2015) 15.

[170]Makker (2017) 897; Paez and Marca (2016) 31.

[171]Paez and Marca (2016) 31.

[172]Paez and Marca (2016) 31.

temperature, or movement,[173] etc. Sensors are considered the spine of IOT technology[174] and improve IOT's effectiveness[175] since they transmit the collected data to the internet and store it on 'cloud-based applications'.[176]

Oracles are supposed to support the IOT by providing information from outside the IOT environment since the IOT is restricted to accessing its own data.[177] An oracle can provide data about the temperature or other environmental conditions for smart contracts,[178] and once these conditions meet the requirements defined in the smart contract can automatically trigger a specified obligation.[179] Due to the abilities of oracles, smart contracts are enhanced to reach the outside world.[180]

5. A PROPOSAL FOR MODERNIZING LETTERS OF CREDIT TO HELP PROTECT THE STRICT COMPLIANCE PRINCIPLE

The substantial compliance standard has created huge debate among parties to letters of credit and the financial industry has always tried to come up with new initiatives to overcome such problems.[181] In the traditional letter of credit, the compliance of documents is decided by experts at a bank regarding whether the content of documents strictly complies with the terms of the letter of credit.[182] However, discrepancies in documents are unavoidable, and the substantial compliance standard is applied to soften the strict compliance rule. Unfortunately, such an act might inject instability into letters of credit. The new technologies, particularly blockchain, smart contracts, and the IOT, might help to make the strict compliance principle more efficient as well as partly change traditional letters of credit.[183] In recent years, different banks have tried to use several platforms developed by different providers to deliver blockchain-based letters of credit, including Voltron,[184] Contour,[185] and Lygon,[186] etc. The communication

---

[173]Makker (2017) 897.

[174]Makker (2017) 897.

[175]Larson (2018) 969.

[176]Paez and Marca (2016) 31.

[177]Greenspan (2016); Hansen et al. (2018) 3.

[178]Chamira (n.d).

[179]Chamira (n.d).

[180]Greenspan (2016).

[181]Rosener (2005) 629.

[182]Thier (1982) 862.

[183]Elsaid (2022). A lot of projects are being implemented to promote platforms for blockchain-based letters of credit between banks. Banks may choose to use the blockchain platforms of different providers to support blockchain-based letters of credit.

[184]HSBC (2021). HSBC China perfectly executed a blockchain-based letter of credit via Voltron in 2021.

[185]HSBC (2020). HSBC Malaysia announced that they can issue blockchain-based letters of credit via the Contour platform.

[186]Dickinson (2021). IMB and the Australia and New Zealand Banking Group Ltd. (ANZ), Westpac Banking Corp., Commonwealth Bank of Australia, and property management company centre Group Limited introduced Lygon, which is a blockchain-based platform that streamlines the bank guarantee process.

between parties could be improved due to the move from traditional to paperless letters of credit.[187]

Consider that the bank of the buyer has joined a blockchain platform to support them to issue a blockchain-based letter of credit. To create this letter of credit, the applicant should at first use the accepted application form regulated by the issuing bank and submit it on the blockchain platform[188] instead of filling out the traditional application which is normally used to draft the letter of credit.[189] Then the applicant should include the IOT terms within this application.[190] The letter of credit should include the INCOTERM to identify the party bearing the risk of loss of the products being tracked by IOT.[191] With this process, the terms of the letter of credit will be drafted more reasonably based on the underlying contract since the applicant has the fundamental information that needs to be included in the letter of credit.[192]

Afterward, the applicant will upload their draft letter of credit on the blockchain, and the issuing bank will consider whether to accept it, or suggest changes.[193] In international transactions, several third parties need to be involved, such as customs, port agencies, etc. Hence, the issuing bank still plays a key role in ensuring that the letter of credit covers these third parties and any other related documents that are needed for the applicants.[194] When the final letter of credit is created, the issuing bank shall start to add other parties[195] to the permissioned blockchain.[196] It is worth noting that the issuing bank can control and restrict the information that the third parties may access.[197]

Once the letter of credit is issued on the blockchain, the process starts. To be specific, each product,[198] before being shipped, will be equipped with a GPS device,[199] a functioning RFID tag,[200]

---

[187]Rosener (2005) 629.

[188]Larson (2018) 971.

[189]Kozolchyk (1986) 288.

[190]McLaughlin (1989a) 1199. Explains that the applicant will list the conditions which the beneficiary need to fulfil if they want to be paid. This rule is also applied to blockchain-based letters of credit so terms are clearly drafted.

[191]Larson (2018) 972.

[192]McLaughlin (1989a) 1198. The underlying contract generates the letter of credit, hence ambiguities in letters of credit may be resolved by the applicant, not the issuing bank.

[193]InfoSystem (2017); Kozolchyk (1992) 78. The bank could help to perfect the letter of credit until parties all agree on the terms.

[194]Larson (2018) 972. The issuing bank must ensure these third parties and related documents issued by them are accounted for in the letter of credit.

[195]Walch (2017) 720. Varghes and Goyal (2017) 9. The blockchain-based letter of credit need not be limited only to the applicant, the beneficiary, and the related banks. Other parties may be included that are not directly related to such credit, such as other entities acting as participating nodes.

[196]Walch (2017) 720. The blockchain-based letter of credit must be issued on a permissioned blockchain due to the need for privacy.

[197]Walch (2017) 720. Parties can add individuals into blockchain and customize what each party can see. For example, the issuing bank can ensure that the entity that uploads the insurance is only able to see that part of the transaction and nothing else.

[198]Gaukler and Seifert (2007) 31.

[199]RFID Journal (2017). GPS devices are able to show real-time tracking.

[200]The RFID tags are used to track the location and quantity of the goods.

and a sensor.[201] The smart contract will release a bill of lading based on the information collected by the RFID when loading the products onto the container to ship.[202] With this technology, parties to the letter of credit should select the documents issued by blockchain since they are 'tamper-proof'.[203] Hence, the documents are deemed to reflect the reality of the situation of the products, and the possibility of the document having errors shall be mitigated.[204] However, there are some kinds of documents that the blockchain cannot create, such as phytosanitary certificates which need to be uploaded to the blockchain.[205]

The role of the issuing bank in determining the compliance of the documents will be partly lessened since the engagement of the issuing bank is called upon only when there is something wrong.[206] The blockchain first evaluates the information in the documents to detect whether it matches the requirements in the terms of the letter of credit through consensus.[207] The smart contract will allow the products to proceed to the next step in the transaction without the interference of the issuing bank if no discrepancies are found, and the blockchain observes that the documents comply.[208] Consequently, if a discrepancy is noticed, the blockchain will inform the issuing bank.[209] The issuing bank will rely on banking practices and the bank's expertise to determine the compliance of the documents, and has the final say.[210] The applicant may be notified about any discrepancy by the issuing bank, and will decide whether to waive this.[211] The concern of the bank in deciding the compliance level of the documents and their frustration with any degree of discretion will be reduced.[212] The bank in general will only need to evaluate any discrepancies in the documents that are announced by the smart contract and does not need to investigate the facts beyond those contained in such documents. It also takes less time for the issuing bank to review the documents in the blockchain compared to with a traditional 'paper-based' letter of credit.[213] The effectiveness of the issuing bank will move to another level because the amount of time the issuing bank needs to evaluate the document is reduced.[214]

---

[201]Swedberg (2017). The sensors detect data regarding the temperate or moisture surrounding the goods and transfer this to the IOT.

[202]Southurst (2016).

[203]Shackelford and Myers (2017) 355.

[204]Cant et al. (2016) 2. Physical documents are more likely to be exposed to error; Lawson (2016) explains that block-chain-based bills of lading are more secure.

[205]Larsen & Toubro Infotech Ltd. (2017), Larson (2018) 974.

[206]Persio (2016).

[207]Wright and Filippi (2015) 7.

[208]Sklaroff (2017) 273. There are debates about whether smart contracts are optimal because they can 'instantaneously effect an exchange of goods based on the satisfaction of specified conditions.

[209]Moakley (2016).

[210]UCP 600 (2007) Article 14(d).

[211]Fama (1985) 1527; Varghes and Goyal (2017) 5. The bank may seek a waiver from their customer if they find discrepancies in documents.

[212]Moses (2005) 45–46.

[213]UCP 600 (2007) Article 14 (b).

[214]Persio (2016)169.

Due to the blockchain and smart contract the applicant no longer needs to be informed about the compliance of the documents since they can get updated information because of the ledger[215] as soon as possible, without notice from the issuing bank. The other information which the applicant always wants to be updated on, such as the actual quality or the quantity of the goods, the temperature of the goods, or whether the seller has shipped non-conforming goods, etc.[216] shall be transmitted to the applicant via the IOT technology. However, disputes arising from these factual conditions will not concern the bank. The applicant should seek judicial remedy. Some arguments suggest that conditions such as the temperature or weight of the goods violate the principle of independence of the letter of credit.[217] As is known, issuing banks are not experts in the industries in which their customers are.[218] In traditional letters of credit, the issuing bank must pay if the presented documents on their face conform to the requirements in the letter of credit, and the temperature of the products or whether the beneficiary has shipped non-conforming products is not relevant.[219] The bank should not investigate the quantity or quality of products either.[220] With traditional letters of credit, these arguments might be grounded and considered non-documentary conditions. However, with blockchain-based letters of credit, concerns will be cleared with the use of IOT technology since IOT can verify the actual data without involving an investigation by the bank.[221] The source of knowledge of blockchain-based letters of credit is the IOT, and does not require the bank's expertise.[222] Hence, banks remain in their zone of expertise and the principle of independence is maintained.

With this type of blockchain-based letters of credit, the strict compliance principle might have a higher chance of being protected.[223] Information from the blockchain is mirrored in the documents, so banks still adhere to their rule, which is only to deal with documents, and the documents produced through the blockchain are considered objective facts.[224] Modern technology will help parties to follow the rules of the letter of credit, since 'computers are more objective than humans'.[225] Most of the documents shall be automatically generated by the blockchain and the smart contract with less involvement of physical documents,[226] which means that discrepancies might be lessened. Discrepant documents could still occur if humans are involved; however, with this proposed model it is expected that new technologies can reduce the

---

[215]Varghes and Goyal (2017) 9.

[216]The conditions of the goods may be detected via the sensors, which represents the technology contributed by IOT. See more information in Subsection 2.3 in Chapter IV.

[217]Moses (2005) 46. The principle of independence requires that the issuing bank shall not consider the contract of sale or investigating the quality or quantity of goods when they examine the conformity of the presented documents.

[218]McLaughlin (1989a) 1201–1202.

[219]Leon (1986) 442. The most attribute of letters of credit which makes them so useful is their independence. The obligations of the issuing bank are independent of the underlying contract.

[220]McLaughlin (1989a) 1201.

[221]See more information in Subsection 2.3 in Chapter IV.

[222]Larson (2018) 931.

[223]Ford (2018); UCP 600 (2007); Byrne (2006) 299; Larson (2018) 976.

[224]Paez and Marca (2016) 31.

[225]Whitaker (1995) 704.

[226]Lawson (2016) explains that blockchain-based bills of lading are more secure if the IOT data is accurate.

potential discrepancies in documentation,[227] and the involvement of the banks in investigating the facts beyond the documents may be limited. Consequently, the chance of applying substantial compliance standards shall be reduced and the strict compliance principle could be protected. Hence, situations in which the strict compliance principle is violated by the substantial compliance standard might be lessened.

6. CONCLUSION

The strict compliance principle has been long considered the essential rule of the letter of credit and creates the commercial utility of this instrument. The application of substantial compliance standard in the letter of credit is not expected by the parties and is not consistent with the intention of the parties. The introduction of substantial compliance standard has been considered to obviate the need for traditional and strict compliance with letter-of-credit law over time.

The financial industry and banks are investigating FinTech and expecting it to modernize letters of credit and other features. With embedded blockchains and smart contracts and IOT, sales contracts can exist together with letters of credit. These technologies can inform the buyer and seller of crucial information about products throughout the process of shipping. Moreover, the burden of the issuing bank with regard to examining the content of documents will hopefully be lifted thanks to blockchain, smart contracts, and IOT.

More time is needed before it can be finally announced that the new technologies are alternatives to current problems in the financial industry. However, the strict compliance principle of letters of credit could be protected due to the application of the blockchain, smart contracts, and IOT, and the letter of credit mechanism might flourish again.

DISCLOSURES

We hereby confirm that this manuscript involves no actual or potential conflict of interest with any party, including but not limited to any financial, personal, or other relationship with other people or organizations within three years of beginning the submitted work that could have inappropriately influenced or be perceived to have influenced the content herein.

The article has solely been created by the authors.

ACRONYMS

ICC   The International Chamber of Commerce
UCP   Uniform of Customs and Practice
UCC   Uniform of Commercial Code
US   United States of America
IOT   Internet of Things

---

[227]Whitaker (1995) 704; Varghes and Goyal (2017) 9.

LITERATURE

Anderson, R. A., *Anderson's Uniform Commercial Code* (3rd edn, Rochester, N.Y., Lawyers Co-operative Pub. Co. 1961).

Arner, D. W., Barberis, J. and Buckley, R. P., 'The Evolution of FinTech: A New Post-Crisis Paradigm?' (2016) 47 *Georgetown Journal of International Law* 1–44.

Bellamy, J. and Hill, C., 'Can the Blockchain Make Our Contracts Smarter?' (2016) Kemp Little <http://www.kemplittle.com/site/articles/kl_bytes/can-the-blockchain-make-our-contracts-smarter> <[https://perma.cc/Q8R3-TJXS]> accessed 30 March 2021.

Bourque, S. and Fung Ling Tsui, S., 'A lawyer 's introduction to smart contracts' in (n.d.) (ed), *Scientia Nobilitat Reviewed Legal Studies* (Scientia Nobilitat 2014) 4–23.

Bradley, J., Barbier, J. and Handler, D., 'Embracing the Internet of Everything To Capture Your Share of $14.4 Trillion (White Paper)' (2013) Cisco <https://www.cisco.com/c/dam/global/en_uk/assets/IoE_Economy_VAS_White_Paper_Europe.pdf> accessed 30 March 2021.

Byrne, J. E., 'Contracting Out of the Uniform Commercial Code: Contracting Out of Revised UCC Article 5 (Letters of Credit)' (2006) 40 *Loyola of Los Angeles Review* 297–400.

Cant, B., Khadikar, A., Ruiter, A. et al., 'Smart Contracts in Financial Services: Getting from Hype to Reality' (2016) Capgemini Consulting <https://www.capgemini.com/consulting-de/wp-content/uploads/sites/32/2017/08/smart_contracts_paper_long_0.pdf> <[https://perma.cc/YZ93-QNTA]> accessed 22 March 2021.

Chamber of Digital Commerce, 'Smart Contracts: 12 Use Cases for Business & Beyond' (2016) <https://digitalchamber.org/wp-content/uploads/2018/02/Smart-Contracts-12-Use-Cases-for-Business-and-Beyond_Chamber-of-Digital-Commerce.pdf> <[https://perma.cc/4R47-NBMS]> accessed 30 March 2021.

Chamira, R., 'Smart Oracles – How Blockchains Communicate With Outside World' (n.d.) Sofocle Technologies <https://www.sofocle.com/blog/smart-oracles-how-blockchains-communicate-outside-world/> accessed 20 March 2021.

de Malynes, G., *Lex Mercatoria or The Ancient Law-Merchant* (1st edn., Universiteitsbibliotheek Gent 1622).

De Sevres, N. K., Chilton, B. and Cohen, B., 'The blockchain revolution, smart contracts and financial transactions' (2016) DLA Piper <https://www.dlapiper.com/en/us/insights/publications/2016/04/the-blockchain-revolution/> accessed 21 March 2021.

Department of Commerce Internet Policy of Task Force & Digital Economy Leadership Team, '*Fostering the Advancement of the Internet of Things*' (2017) <https://perma.cc/8DYS-K9PT> accessed 19 March 2021.

Dickinson, A., 'Blockchain and letters of guarantee' (2021) IBM <https://www.ibm.com/blogs/blockchain/2021/04/blockchain-and-letters-of-guarantee/> accessed 30 August 2022.

Dolan, John F., 'Strict Compliance with letters of Credit: Striking a Fair Balance' (1985) 102 *Banking Law Journal* 18–32.

Dolan, J. F., *The law of Letter of credit: Commercial and Standby Credits* (Vol. 4., Warren, Gorham & Lamont Incorporated 1996).

Eckenrode, J., 'The Derivative Effect: How Financial Services Can Make IOT Technology Pay Off' (2015) Deloitte Insights <https://www2.deloitte.com/insights/us/en/focus/internet-of-things/iot-in-financial-services-industry.html?id=us:2el:3dc:dup1166:eng:fsi:iot:dcpromo> <[https://perma.cc/HM6X-HHFW]> accessed 21 March 2021.

Economic Intelligence Unit, 'The Internet of Things Business Index: A Quiet Revolution Gathers Pace' (2013) <https://halberdbastion.com/sites/default/files/2018-01/EIU-Internet-Business-Index-2013.pdf> accessed 30 August 2022.

Ellinger, E.P., 'The Uniform Customs- Their nature and the 1983 Revision' (1984) Lloyd's Mar. & Com. L.Q. 578–579.

Elsaid, H. M., 'The application of blockchain in trade finance: opportunities and challenges' (2022) Trade Finance Global <https://www.tradefinanceglobal.com/posts/the-application-of-blockchain-in-trade-finance-opportunities-and-challenges/> accessed 30 August 2022.

Evans, D., 'Beyond Things: The Internet of Everything, Explained in Four Dimensions' (2013) Huffpost <https://www.huffingtonpost.com/dave-evans/cisco-beyond-things-the-interne_b_3976104.html> < [https://perma.cc/6BYC-7SH5]> accessed 21 March 2021.

Fama, A. Jr., 'Letters of Credit: The Role of Issuer Discretion in Determining Documentary Compliance' (1985) 53 *Fordham Law Review* 1519–1539.

Ford, N., 'How we Built an IoT Application in 10 Days Using Watson IoT and IBM Blockchain' (2018) Mendix <https://www.mendix.com/blog/built-iot-application-10-days-using-watson-iot-ibm-blockchain/> <[https://perma.cc/HD5X-VSCC]> accessed 24 March 2021.

Gaukler, G. M. and Seifert, R. W., 'Applications of RFID in Supply Chains' in Jung, H., Jeong, B. and Chen, F. F. (eds), *Trends in Supply Chain Design and Management: Technologies and Methodologies* (Springer 2007) 29–48.

Grassi, P. S., 'Letter of Credit Transactions: The Banks' Position in Determining Documentary Compliance- A comparative Evaluation under the U.S, Swiss and German Law' (1995) 7 *Pace International Law Review* 81–128.

Greenspan, G., 'Why Many Smart Contract Use Cases Are Simply Impossible' (2016) Coindesk <https://www.coindesk.com/three-smart-contract-misconceptions/> <[https://perma.cc/85NQ-KHX3]> accessed 21 March 2021.

Hansen, J. D., Rosini, L. and Reyes, C. L., 'More Legal Aspects Of Smart Contract Applications' (2018) Perkins Coie <https://www.perkinscoie.com/images/content/1/9/v3/199672/2018-More-Legal-Aspects-of-Smart-Contract-Applications-White-Pa.pdf> <[https://perma.cc/XY73-TZ2L]> accessed 21 March 2021.

Hennah, D. and Jarrold, B., 'The Digitisation of Trade' in Malaket, A. R., Broom, D., Evans, M. et al. (eds), Rethinking Trade & Finance (ICC 2017) 226–233 <https://cdn.iccwbo.org/content/uploads/sites/3/2017/06/2017-rethinking-trade-finance.pdf> accessed 19 March 2021.

Hochstein, M., 'Bank Think Fintech (the Word, That Is) Evolves' (2015) American Banker <https://www.americanbanker.com/fintech-the-word-that-is-evolves-1077098-1.html> accessed 30 August 2022.

HSBC, 'Cross-border Letter of Credit Blockchain Transaction' (2021) <https://www.business.hsbc.com.cn/en-gb/campaigns/smarter-banking/global-trade-blockchain> accessed 30 August 2022.

HSBC, 'Reshaping trade finance with blockchain' (2020) <https://www.business.hsbc.com.my/en-gb/campaigns/reshaping-trade-finance-with-blockchain> accessed 30 August 2022.

Hughes, B., 'Smart Contracts: Here Are the Practical Applications of This Exciting Blockchain Technology' (2018) Enterpreneur <https://www.entrepreneur.com/article/320467> <[https://perma.cc/S8X2-4ULD]> accessed 21 March 2021.

InfoSystems, 'The Seven Steps to a Blockchain-Based Letter of Credit (LC) Transaction' (2017) <http://infosystems.mu/the-seven-steps-to-a-blockchain-based-letter-of-credit-lc-transaction> < https://perma.cc/GSE2-WSCQ> accessed 15 November 2022.

Institute of International Finance, 'Getting Smart: Contracts on the Blockchain' (2016) <https://www.iif.com/Publications/ID/582/Getting-Smart-Contracts-on-the-Blockchain> accessed 21 March 2021.

Kolyer, S. T., 'Judicial Development of Letters of Credit Law: A Reappraisal' (1980) 66 *Cornell Law Review* 144–166.

Kozolchyk, B., 'Is Present Letter of Credit Law Up to Its Task' (1986) 8 *George Mason Law Review* 285–352.

Kozolchyk, B., 'Letters of Credit' in Ziegel, J. (ed), *International Encyclopedia of Comparative Law* Vol 9. Ch 5. (Mohr Siebeck 1980) 5–23.

Kozolchyk, B., 'The Paperless Letter of Credit and Related Documents of Title' (1992) 55 *Law and Contemporary Problems* 39–101.

Lanchester, J., 'When Bitcoin Grows Up' (2016) London Review of Books <https://www.lrb.co.uk/the-paper/v38/n08/john-lanchester/when-bitcoin-grows-up> accessed 25 March 2021.

Larsen & Toubro Infotech Ltd., 'What is Trade Finance- Letter of Credit Trade Finance Using Blockchain' (2017) <https://www.youtube.com/watch?v=5wkkIaemSw4&t=83s> accessed 25 March 2021.

Larson, D. A., 'Mitigating Risky Business: Modernizing Letters Of Credit With Blockchain, Smart Contracts, And The Internet Of Things' (2018) 2018 *Michigan State Law Review* 929–985.

Lawson, S., 'Worm on the Sensor: What Happens When IoT Data Is Bad?' (2016) Computerworld <https://www.computerworld.com/article/3151402/internet-of-things/worm-on-the-sensor-what-happens-when-iot-data-is-bad.html> <[https://perma.cc/F79E-2H9C]> accessed 22 March 2021.

Lehmacher, W. and Mcwaters, J., 'How blockchain can restore trust in trade' (2017) World Economic Forum <https://www.weforum.org/agenda/2017/02/blockchain-trade-trust-transparency/> accessed 10 March 2021.

Leon, C., 'Letters of Credit: A Primer' (1986) 45 *Maryland Law Review* 432–464.

Lewis, A., 'A gentle introduction to smart contracts' (2016) Bits on Blocks <https://bitsonblocks.net/2016/02/01/gentle-introduction-smart-contracts/> accessed 30 March 2021.

Makker, S. R., 'Overcoming foggy notions of privacy: How data minimization will enable privacy in the internet of things' (2017) 85 *UMKC Law Review* 895–914.

Mann, R. J., 'The Role of Letters of Credit in Payment Transactions' (2000) 98 *Michigan Law Review* 2494–2536.

MAREX, 'ZIM Trials Blockchain Bill of Lading' (2017) The Maritime Executive <https://maritime-executive.com/article/zim-trials-blockchain-bill-of-lading> < [https://perma.cc/4ZQL-8BFH]> accessed 30 March 2021.

McLaughlin, G. T., 'Exploring Boundaries: A legal and Structural Analysis of the Independence Principle of Letter of Credit Law' (2002) 119 *Banking Law Journal* 501–565.

McLaughlin, G. T., 'Letters of Credit and Illegal Contracts: The Limits of the Independence Principle' (1989a) 49 Ohio State Law Journal 1197–1236.

McLaughlin, G. T., 'On the Periphery of Letter of Credit Law: Softening the Rigors of Strict Compliance' (1989b) 106 Banking Law Journal 4–41.

Mendelowitz, A. I. and Brammertz, W., 'Smart Contracts Were Around Long Before Cryptocurrency' (2016) American Banker <https://www.americanbanker.com/opinion/smart-contracts-were-around-long-before-cryptocurrency> accessed 30 March 2021.

Miller, N. I., 'Problems and Patterns of the Letter of Credit' (1959) Spring 1959 University of Illinois Law Review 162–201.

Moakley, G., 'Smart Freight Technology Powered by the Internet of Things' (2016) Intel <https://www.intel.com/content/dam/www/public/us/en/documents/solution-briefs/smart-freight-technology-powered-by-the-internet-of-things.pdf> <[https://perma.cc/8AFK-TTA8]> accessed 24 March 2021.

Moses, M. L., 'Letters of Credit and the Insolvent Applicant: A Recipe for Bad Faith Dishonor' (2005) 57 *Alabama Law Review* 31–74.

Mougayar, W., 'If You Understand Google Docs, You Can Understand Blockchain' (2016) Coindesk <https://www.coindesk.com/understand-google-docs-can-understand-blockchain/> <[https://perma.cc/8UMS-PG35]> accessed 25 March 2021.

O'Shields, R., 'Smart Contracts: Legal Agreements for the Blockchain' (2017) 21 *North Carolina Banking Institute* 177–194.

Paez, M. and La Marca, M., 'The Internet of Things: Emerging Legal Issues for Businesses' (2016) 43 *Northern Kentucky Law Review* 29–72.

Perry, J. S., 'What Is Blockchain? A Primer on Distributed Ledger Technology' (2017) IBM Developer <https://developer.ibm.com/dwblog/2017/what-is-blockchain-hyperledger-fabric-distributed-ledger/> <[https://perma.cc/HJS7-Y6UT]> accessed 30 March 2021.

Persio, S. L., 'Connect Everything: Trade Finance and the Internet of Things' (2016) Global Trade Review <https://www.gtreview.com/magazine/volume-15-issue-1/connect-everything-trade-finance-and-the-internet-of-things/> <[https://perma.cc/2DWT-2ABV]> accessed 25 March 2021.

Pinna, A. and Ruttenberg, W., 'DistributedLedger Technologies in Securities Post-Trading' (2016) European Central Bank <https://www.ecb.europa.eu/pub/pdf/scpops/ecbopl72.en.pdf> <[https://perma.cc/68U5-C93N]> accessed 30 March 2021.

PwC, 'Redrawing the Lines: FinTech's Growing Influence on Financial Services' (2017) <https://www.pwc.com/gx/en/industries/financial-services/assets/pwc-fintech-exec-summary-2017.pdf> <[https://perma.cc/6KKN-L753]> accessed 20 March 2021.

PYMNTS, 'Trade Finance to Fuel Blockchain's Rise This Year, Says IBM' (2017) <https://www.pymnts.com/news/b2b-payments/2017/ibm-blockchain-mizuho-letter-credit-global-trade-disruption/> accessed 21 March 2021.

RFID Journal, 'Can RFID Be Used to Track the Movements of Goods Across the Country?' (2017) <https://www.rfidjournal.com/question/can-rfid-be-used-to-track-the-movements-of-goods-across-the-country> accessed 22 March 2021.

Rosener, J. D., 'Recent Developments: Letter of Credit Transactions' (2005) 1 *Journal of Payment Systems Law* 627–647.

Roy, S. and Chowdhury, C., 'Integration of Internet of Everything (IoE) With Cloud' in Batalla, J., Mastorakis, G., Mavromoustakis, C. and Pallis, E. (eds), *Beyond the Internet of Things* (Springer 2017) 199–222.

Shackelford, S. J. and Myers, S., 'Block-by-Block: Leveraging the Power of Blockchain Technology to Build Trust & Promote Cyber Peace' (2017) 19 *Yale Journal of Law and Technology* 334–388.

Shen, L., 'Blockchain Will Be Used By 15% of Big Banks By 2017' (2017) Fortune <http://fortune.com/2016/09/28/blockchain-banks-2017/> accessed 30 March 2021.

Shome, A., 'BBVA Is Using Blockchain to Streamline International Trade Transactions' (2017) Finance Magnates <https://www.financemagnates.com/cryptocurrency/news/bbva-using-blockchain-streamline-international-trade-transactions/> <[https://perma.cc/293H-RY8M]> accessed 30 March 2021.

Sklaroff, J. M., 'Smart Contracts and the Cost of Inflexibility' (2017) 166 *University of Pennsylvania Law Review* 263–303.

Southurst, J., 'How Blockchain Contracts and IoT Could Save Global Shipping Billions' (2016) Bitcoin.com <https://news.bitcoin.com/blockchain-save-global-shipping-billions/> <[https://perma.cc/3GF4-JQMS]> accessed 22 March 2021.

Stanley, A., 'Trump White House Doubles Down on US Commitment to Blockchain' (2017) Coindesk <https://www.coindesk.com/trump-white-house-doubles-us-commitment-blockchain/> <[https://perma.cc/QZG8-FC26]> accessed 19 March 2021.

Swedberg, C., 'Passive Sensor Tags to Surpass 5 Million Units This Year' (2017) RFID Journal <https://www.rfidjournal.com/passive-sensor-tags-to-surpass-5-million-units-this-year> accessed 21 March 2021.

Tapscott, D. and Tapscott, A., *Blockchain Revolution: How the Technology behind Bitcoin is changing money* (1st edn, Portfolio 2016).

Task Force, Study of U.C.C. *Article 5, An Examination of U.C.C. Article 5 (Letters of Credit).* (1990) Study of UCC, Uniform Commercial Code Committee of the American Bar Association's Business Law Section, Letter of Credit Subcommittee, Uniform Commercial Code Committee of the American Bar Association's Business Law Section and the U.S. Council on International Banking, Inc., 1521.

Thier, J. D., 'Letters of Credit: A Solution to the Problem of Documentary Compliance' (1982) 50 *Fordham Law Review* 848–876.

Trautman, L. J. and Molesky, M. J., 'A Primer for Blockchain' (2019) 88 *UMKC Law Review* 239–284.

Trimble, R. J., 'The Law Merchant and the Letter of Credit' (1948) 61 *Harvard Law Review (The Harvard Law Review Association)* 981–1008.

Uzzelle, G. H. III, 'Letter of credit' (1985) 10 *Maritime Lawyer* 47–70.

Varghese, L. and Goyal, R., 'Blockchain For Trade Finance: Payment Method Automation (Part 2)' (2017) Cognizant <https://www.cognizant.com/whitepapers/blockchain-for-trade-finance-payment-method-automation-part-2-codex3071.pdf> <[https://perma.cc/W83X-HRJU]> accessed 22 March 2021.

Walch, A., 'The Path of the Blockchain Lexicon (And the Law)' (2017) 36 *Review Banking and Financial Law* 713–766.

Want, R., Schilit, B. N. and Jenson, S., 'Enabling the Internet of Things' (2015) 48 *Computer* 28–35.

Wass, S., 'CGI integrates blockchain with conventional trade finance platform' (2017) Global Trade Review <https://www.gtreview.com/news/fintech/cgi-integrates-blockchain-with-conventional-trade-finance-platform/> <[https://perma.cc/KMT8-8T92]> accessed 19 March 2021.

Whitaker, R. D., 'Letters of Credit and Electronic Commerce' (1995) 31 *Idaho Law Review* 699–718.

Wright, A. and De Filippi, P., 'Decentralized Blockchain Technology and The Rise of Lex Cryptographia' (2015) SSRN <https://ssrn.com/abstract=2580664> accessed 20 March 2021.

CODES

International Chamber of Commercial "U.C.P 82" *ICC Uniform Customs and Practice for Documentary Credit Publication UCP No. 82.* 1933.

International Chamber of Commerce "U.C.P 600". *ICC Uniform Customs and Practice for Documentary Credit Publication No. 600.* 2007.

Uniform of Commercial Code 1952.

Uniform of Commercial Code 1995.

JUDGMENTS OF THE COURTS

Consolidated Aluminum Corp. v. Bank of Virginia. (US District Court for the District of Maryland, June 29, 1982).

Equitable Trust Co. of New York v. Dawson Partners, Ltd. (House of Lord, 1927).

Corporacion De Mercadeo Agricola v. Mellon Bank Int'l. (United States Court of Appeal, the Second Circuit, October 02, 1979).

Fidelity Nat'l Bank v. Dade County. (District Court of Appeal of Florida, Third District, May 29, 1979).

AMF Head Sports Wear, Inc. v. Ray Scott's All-Am. Sports Club. (U.S. District Court for the District of Arizona, April 04, 1978).

Courtaulds No. Am., Inc. v. North Carolina Nat. Bank. (United States District Court, M.D. North Carolina, Greensboro Division, January 07, 1975).

U.S Industries v. Second New Haven Bank. (United States District Court, D. Connecticut, November 17, 1978).

Mahon v. Stowers. (U.S. Supreme Court, April 15, 1974).

Crocker Commercial Services v. Countryside Bank. (US District Court for the Northern District of Illinois, December 30, 1981).

Banco Espanol De Credito v. State Street Bank & Trust Co. (U.S. District Court for the District of Massachusetts, March 27, 1967).

Flagship Cruises, Ltd. v. New England Merchants Nat'l Bank of Boston. (U.S. Court of Appeals for the First Circuit, January 20, 1978).

New York Life Ins. v. Hartford Nat. Bank Trust. 378 A.2d 562 (Supreme Court of Connecticut, 1977).

Insurance Co. of North America v. Heritage Bank. (United States Court of Appeals, Third Circuit., March 19, 1979).

Chase Manhattan Bank v. Equibank. (United States Court of Appeals, Third Circuit, February 16, 1977).

Hadden v. Consolidated Edison Co. (Court of Appeals of the State of New York, May 01, 1974).

LINKS

Link1: 'Hashing Functions and Their Uses In Cryptography' <https://www.umsl.edu/~siegelj/information_theory/projects/HashingFunctionsInCryptography.html> accessed 7 October 2022.

Link2: 'Encryption' <https://www.techtarget.com/searchsecurity/definition/encryption> accessed 7 October 2022.

Link3: 'Encryption' <https://dictionary.cambridge.org/dictionary/english/encryption> accessed 7 October 2022.