

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/348236148>

Blockchain-based Supply Chain Financing Solutions for Qatar

Preprint · January 2021

DOI: 10.13140/RG.2.2.18262.27206

CITATION

1

READS

655

2 authors, including:



Mohamed Ismail Umlai
Qatar University

3 PUBLICATIONS 12 CITATIONS

SEE PROFILE

Blockchain-based Supply Chain Financing Solutions for Qatar

Charfeddine, Lanouar ⁱ

Umlai, Mohamed ⁱⁱ

College of Business and Economics, Qatar University

1 | INTRODUCTION

When it comes to trade, operations or expansion, access to finance from conventional sources such as financial institutions (FIs) can become a major hurdle for companies (International Chamber of Commerce [ICC], 2020). This is especially the case for firms that fall under the small, medium enterprise (SME) category due to either lacking financial strength or being relatively new to the market and therefore lacking credit history. Due to the smaller size of SMEs in comparison to larger corporate customers, FIs and banks alike do not seem to be addressing SME demand for more flexible financing options (Ash, 2018).

According to a recent report by the Asian Development Bank, there exists a 1.5 trillion (US) dollar gap in terms of unmet trade financing requests worldwide (Asian Development Bank [ADB], 2017). Furthermore, the report adds that 74% of rejected trade finance requests come from SMEs and midcap firms. By 2025, the World Trade Organization (WTO) projects that the trade financing gap could increase to a whopping 2.5 trillion (US) dollars globally, further exacerbating the situation for SMEs in developing countries (MarcoPolo, 2020). This is also worsened by the recent COVID-19 pandemic.

Difficulties in accessing trade finance is commonly cited as an obstacle for continued business by importers and exporters. This can include issues with working capital, cashflow, asset purchases (for property, plant and equipment), staff training/development, expanding to new markets or acquiring new businesses, research and most importantly, financing import shipments and/or exports. According to MarcoPolo (2020), when financing requests by such companies to FIs are rejected, this usually means a trade transaction has reached a dead-end. Considering that SME firms represent up to 90% of businesses and are the source of more than 50% of global employment (World Bank, 2020), there is a dire need for the exploration and development of more innovative trade financing solutions.

The aim of this white paper is to present various blockchain-based supply chain finance solutions and highlight some of the potential financial and economic benefits they offer. We do this by first reporting on the state SME trade financing in the wider region (i.e., the Gulf Cooperation Council or GCC), then presenting the circumstances for SME importers in Qatar. Next, we contrast

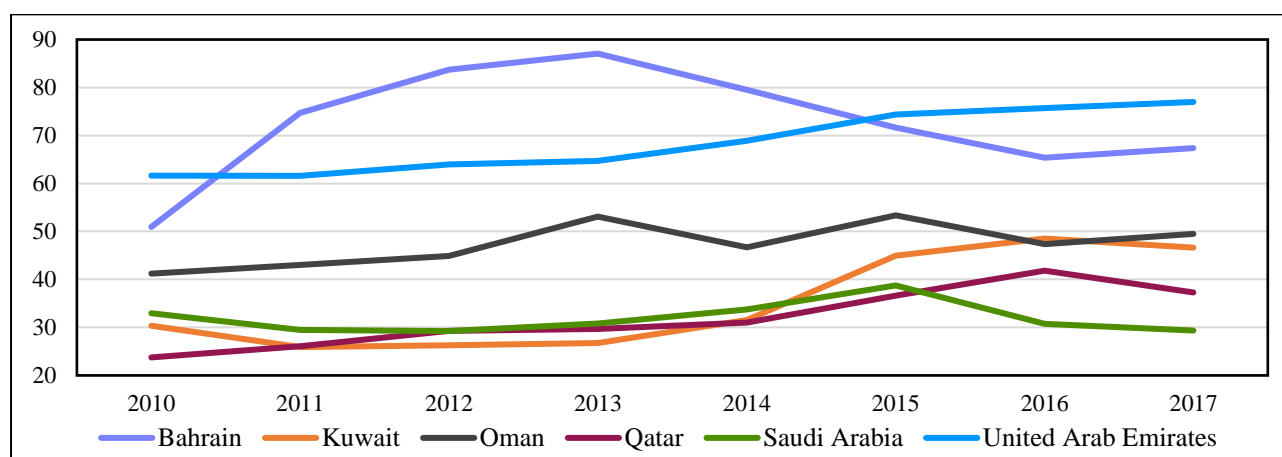
conventional trade finance instruments with newer and more innovative blockchain-based solutions.

2 | TRADE FINANCING IN THE GULF

Being a relatively small peninsula, the Gulf state of Qatar has established itself as one of the most important oil and gas exporters in the world. Qatar is an independent and sovereign country and shares only one land border, with Saudi Arabia, and is a member of the GCC along with five other member states. In a surprise move, however, Bahrain and Yemen, led by the United Arab Emirates and Saudi Arabia severed relations with Qatar on the 5th of June 2017. The blockading countries, including the Maldives and the eastern-based government in Libya, alleged that Qatar was enabling the financing of terrorism in the region and listed 13 demands that it had to abide by. In addition to the country's main trade route with KSA being closed, cargo ships serving Qatar were also not permitted to dock at blockading-country ports and airspaces were closed to Qatari aircrafts. Only Kuwait and Oman (fellow member of the GCC as well) maintained their ties with Qatar, the former also attempting to mediate in the dispute (BBC News, 2017).

Political disputes in the region did have an effect on import and export levels temporarily. However, even before the blockade, the GCC was (and still is) in need of supply chain financing (Smyth, 2010). As a percentage of gross national product (GDP), the import of goods and services (seen in Figure 1 below) of 37.26% for Qatar in 2017, is higher than that of KSA (at 29.34% but lower than four other GCC nations. Likely culprits for this are inadequate SME financing as well as a high dependency on revenue from the sale of hydrocarbons/fossil fuels to the international market (as exports).

Figure 1: Imports of goods and services (% of GDP)



Data from World Integrated Trade Solution (WITS) Database

According to the International Monetary Fund (IMF), increasing the level of access to finance in the region to match levels of other emerging markets would yield a 1% increase in annual country growth as well as the opportunity to create almost 8 million jobs by 2025 (IMF, 2019). Importers in the Gulf region have a slew of economic risks that they have to withstand. Fluctuations in demand, oil prices, currency exchange rate instability and insufficient cash margins can negatively affect balance sheets or even lead to bankruptcy (Ash, 2018). Economic disruptions such as those witnessed in 2020 due to the Coronavirus pandemic make it all the more important for importers to be able to access financing tailored to their size/needs in order to survive.

3 | FINANCING OPTIONS FOR IMPORTERS

Importers do have the ability to finance their operations as clients of local financial institutions (European Commission & European Central Bank Survey, 2020). However, these options are dependent upon years of operation and their ability to provide (on average) up to 3-years of audited financial statements. Furthermore, strains on the economy in Qatar for instance due to the COVID-19 pandemic have increased the prerequisites demanded by FIs in the country to include more securities and collaterals.

A **credit line** is the most common form financing an SME can obtain from banks. This involves a loan that is pre-arranged that can be utilized either in part, or in full when advance warning is made by the importer. This differs from an ordinary bank loan as the latter includes a pre-determined loan amount (including interest) and pre-determined dates for their repayment. Meanwhile, for credit lines, interest is only payable on money amounts actually withdrawn by the importer, which may be nothing in some circumstances. **Bank overdrafts** are another service an importer can rely on. These entail the ability of the company to cause negative balances in accounts with their FIs. Companies may or may not incur specific penalties for an overdraft depending on prior arrangements made/length of time the account is overdrawn. Another facility FIs offer their corporate clients are **credit card overdrafts** which are similar to bank overdrafts but involves negative balances on corporate credit cards instead.

Between the importer and their supplier, **trade credit** can be used. This involves a later payment for goods or services received from a supplier usually in the realm of 30/60/90 days. In some situations, importers may be also able to access **participating loans**. These give lenders the ability to convert the amount loaned into equity interest or ownership in the importing company under specific conditions. Some importers can raise **equity capital** via the sale of shares however, this does not usually apply to the SME category due to their smaller size. Companies that are listed on the local stock exchange usually opt for this type of financing via initial public offerings (IPOs) or

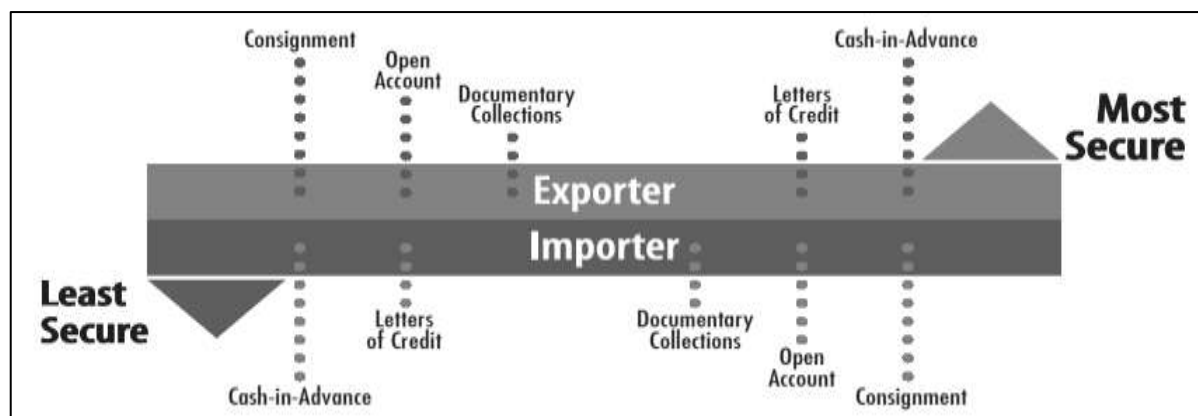
issue **debt securities** (which are short/long term commercial papers/corporate bonds), again reserved to mainly larger companies. SMEs can however make private sales to investors directly, including to **business angels** or in the form of **venture capital**. These may be individual investors or firms that provide capital to innovative start-ups. Importers in some countries can access **subordinated debt instruments** via their FIs. These stipulate that debt is repaid only once other higher priority debts have been cleared.

In exchange for regular payments, **leasing or lease-to-own** services are usually more direct methods for importers as well as other SMEs to use or obtain fixed assets without going through FIs, generally. Ownership of these assets is not transferred until all payments are complete. Usually in cases of economic strain, governments issue **grants or subsidized bank loans** to help importers and other SME businesses. Money can come in the form of guarantees from public sources or in the case of loans, offer lower interest rates. Other financing options include **retained earnings/asset sales** which are sources of internal funds either from reinvesting company profits or selling some of their unwanted fixed assets.

Importers can and usually also opt for **factoring** and its variations which essentially entails another company collecting debts on the SME's behalf in return for less than invoiced cash payment. Factoring companies make a profit through this difference in amounts. Recently, SMEs in other countries have begun looking into **peer-to-peer lending** and **crowdfunding** to finance their activities. These are relatively new and non-traditional sources of finance for businesses. Using dedicated online platforms, unrelated business or individuals can lend money to an SME in a peer-to-peer lending scenario. Meanwhile crowdfunding entails the financial contributions from a vast amount of individuals/business online. Both these methods side-step the necessity of having financial institution as an intermediary.

4 | TRADITIONAL TRADE FINANCE METHODS

There are five common methods of payment in international trade between importers and their suppliers. However, these methods are at loggerheads in terms of risk/security from the buyer/seller perspectives (as can be seen in Figure 2). *“Importers want to receive the goods as soon as possible but to delay payment as long as possible, preferably until after the goods are resold to generate enough income to pay the exporter”* (International Trade Administration [ITA], 2012, p.3). To better understand the instruments used in trade financing, we have outlined the main advantages and disadvantages of each, below:

Figure 2: Traditional Trade Finance Instruments

Taken from ITA (2012)

4.1 | Letters of Credit

Letters of Credits (LCs) are some of the most common instruments used in international trade finance. A letter of credit serves as payment guarantee by a buyer's bank for goods sold the exporter. Payment is processed when all terms and conditions stipulated in an LC are met, including the presentation of necessary documentation. In exchange for payment, the buyers bank grants credit to the buyer. These types of arrangements are particularly useful in situations where obtaining credit information about a foreign buyer is tough. The exporter therefore relies on the creditworthiness of this buyer's bank. Since the obligation of payment only begins when goods have been shipped, the LC decreases risk for the buyer (ITA, 2012).

4.2 | Cash-in-Advance

This method sidesteps the issue of credit risk for an exporter. As the name indicates, cash-in-advance payments occur before the actual transfer of goods/their ownership. Wire transfers, credit cards and other modes of payment can be used when paying for international sales in advance. New payment options via the internet also provide an avenue for cash-in-advance transactions. To the importer however, cash-in-advance is quite unfavorable due to the significant risk it entails. Fear of goods not being sent after an advance payment has taken place is usually the main obstacle in these scenarios. From a competitive standpoint, exporters may need to offer their customers more flexible payment terms instead of insisting for cash-in-advance (ITA, 2012).

4.3 | Open Account

Open account transactions are the opposite of Cash-in-Advance options and involve the shipment and delivery of goods before payment. International transactions usually stipulate 30/60/90-day payment terms. Open account transactions place significant risks on exporters while being quite

advantageous for importers in terms of cashflow. However, in order to remain competitive in the market, exporters sometimes need to take on these risks. Foreign buyers also expect these types of arrangements in light of global economic effect of the recent COVID-19 pandemic. The role of credit insurance in these scenarios are increasingly important for exporters (ITA, 2012).

4.4 | Trade on Consignment

Through a contractual arrangement, international consignment transactions involve the receiving, managing and selling of goods by a foreign distributor. Only once goods are sold to the end customer does payment to the exporter occur. Consignments are considered a variation of open account transactions (ITA, 2012). Again, the exporter bears significant risk as their goods are in the care of an agent or independent distributor, situated in a foreign country and without assurance of payment. In exchange of this risk, exporters use consignment to stay competitive in foreign markets by shoring up availability of their stock. On the plus side, direct costs of managing and warehousing of inventory is reduced for the exporter. Partnering up with reliable and well-established logistics companies / distributors overseas is key to making consignments effective (ITA, 2012). Risk of non-payment for consigned goods may be mitigated through the use of adequate insurance coverage for goods in transit or in the distributor's custody (ITA, 2012).

4.5 | Documentary Collections (DCs)

A documentary collection (or DC) is a transaction that has some resemblance to an LC albeit cheaper. DCs involves a greater role for an exporter/seller's bank, wherein they are entrusted to send documents to the importer/buyer's bank and request payment on behalf of the exporter once documents are forwarded to the importer. Funds once received are remitted to the exporter via the banks involved. With DCs, the importer is required to pay the face value amount against sight of documents or on a specified date. Even though banks represent the importer and exporter respectively, DCs do not offer verification and in the event of non-payment by the importer, little can be done (ITA, 2012).

5 | LIMITATIONS OF TRADITIONAL TRADE FINANCE METHODS

The traditional approach to trade finance and its related instruments is considered rigid and time consuming. Conventionally, importers/exporters either use secure trade services offered by their local FIs, undertake smaller orders to minimize risk or trade using advance payments. The downside to these methods however is that potential growth of SMEs of this category is stifled. Local importers are exposed to increasing costs for compliance and fraud protection amid increased cyber threats. Meanwhile, the availability of electronic supply chain management tools

have meant that open account transactions have become more prevalent in comparison to LCs for importers and exporters (Conn *et al.*, 2009). In Europe for instance, intra-regional trade amongst neighboring countries rarely makes use of LCs. This is due to goods being delivered faster than the time it takes for burdensome LC procedures to be finalized (WTO, 2018).

Furthermore, according to Sawashe (2019), LCs have several drawbacks in terms of banking and messaging fees, well as currency risks, potential misuse of LCs and disputes arising from contractual obscurities. For instance, expenses relating to fees charged by banks for providing their intermediary roles can add up for both importers and exporters. This is especially the case when additional features are involved, making it a costly affair for SMEs with lower liquidity/financial resources (Sawashe, 2019). The use of SWIFT (or wire transfer) messaging by financial institutions is both time consuming and expensive when it comes to amendments. When dealing with international trade and LCs, foreign exchange risk resulting from fluctuating currency rates is something that importers and exporters need to grapple with constantly. One party is usually disadvantaged, necessitating the use of complex hedging instruments. Moreover, the interpretation of legal clauses can result in disputes between the buyer and seller and require intervention from respective banks. According to a study by the ICC (2020), 60-70% of LC evaluations are rejected in their first instances due to discrepancies in legal language. On a more sinister note, importers can face a significant risk of fraud in terms of the quality of the goods received. This is because their bank will disburse funds to the exporter upon examination of shipping documents and not the material grade, for example.

6 | BLOCKCHAIN-BASED SOLUTIONS

6.1 | What is blockchain?

Blockchain is a networking technology that was developed in a white paper on Bitcoin (a cryptocurrency), by an unknown person/group using the alias 'Satoshi Nakamoto' back in 2008. Blockchain is essentially the base that data is structured on, in the form of combined records, referred to as **blocks** that are connected to a **chain** (Cole *et al.*, 2019). This chain serves as a distributed ledger that is maintained various participants on a P2P (peer-to-peer) network where no single person has full control. The use of cryptography to verify data and transactions on the ledger is what gives the technology its edge in terms of dealing with issues of accountability and disclosure. Blockchain has gained increased popularity in meeting the needs of businesses to streamline their processes (Cole *et al.*, 2019).

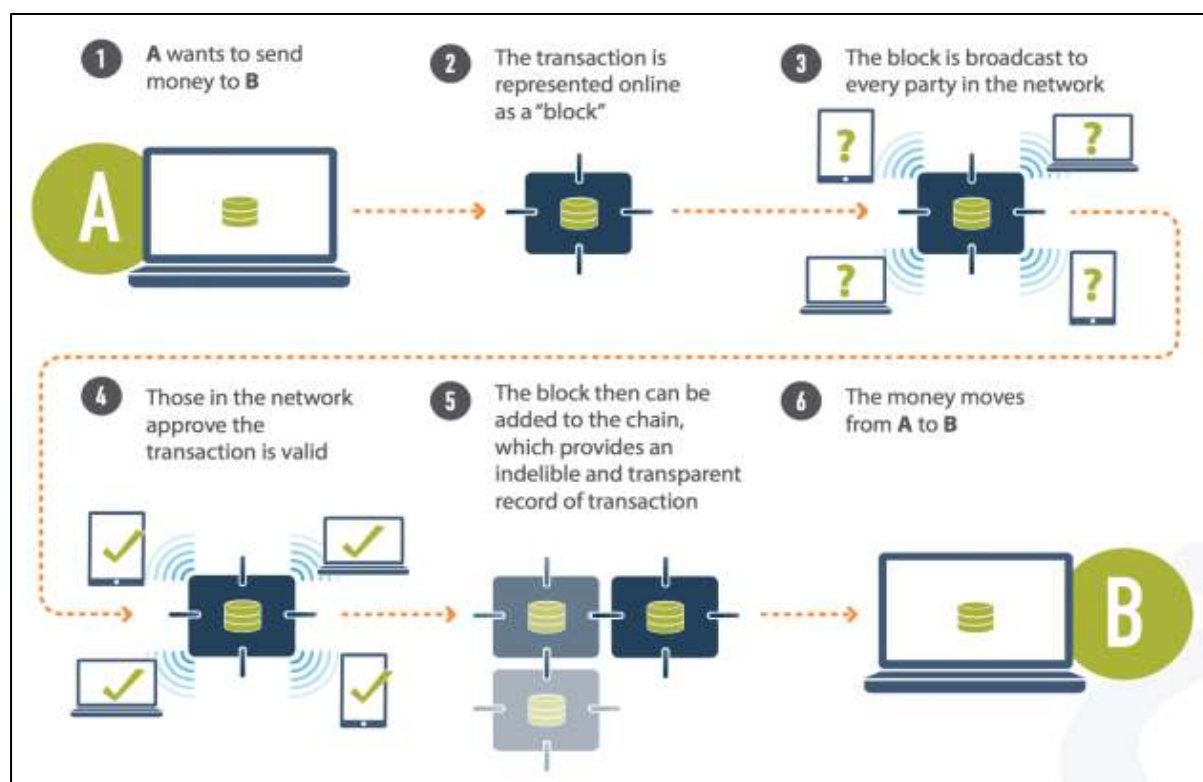
The main advantages of using blockchain in trade financing include the reduction in costs and processing time, elimination of paper waste and increased transparency, and as a result, ensured

security and trust. This new and innovative method of doing business dramatically minimizes the risk of manipulation of figures within the supply chain due its embedded transparency. Supply chain financing platforms based on blockchain and digital ledger technology (DLT) facilitate trade financing between parties on a more direct basis and therefore increases market efficiency (MarcoPolo, 2020).

6.2 | Blockchain Fundamentals

According to Yang (2019), the use of blockchain technology is readily being seen in supply chains such as maritime shipping. The innovation is said to enhance efficiency by having digitized records, real-time cargo tracking, transparency in global supply chain and faster clearing times via customs (Yang, 2019). Outside of finance, blockchain usage is still in its experimental stages. Nevertheless, agriculture, healthcare, energy and notarization are some of the next promising non-finance applications of blockchain (Kshetri, 2018). In combination with Internet of Things (IoT), radio frequency identification (RFID), global positioning satellite (GPS) tags, barcodes and other sensors, blockchain is set to revolutionize supply chain management (SCM) (Kshetri, 2018). Ship container locations and even the packages within them will be trackable in real-time. Figure 3 illustrates the basic principles of a blockchain transaction involving the transfer of funds. A digital ledger, smart contracts and consensus are three processes that enable blockchain to function. They are elaborated on in further detail below:

Figure 3: How blockchain transactions work



Adapted from Koetsier (2017)

6.2.1 | *Distributed Ledger*

All transactions that take place on the network are recorded by the distributed ledger, which essentially functions as the heart of a blockchain network. Several network participants possess copies of a blockchain's ledger and collectively maintain it. This is the primary reason why blockchain ledgers are considered decentralized. Using cryptographic techniques, information recorded onto a blockchain can only be appended, thereby guaranteeing that the ledger cannot be modified post-transaction. This contributes to the immutability nature of blockchains and DLT, ensuring that information cannot be altered and therefore can be trusted. Figure 4 compares DLT to traditional central record books.

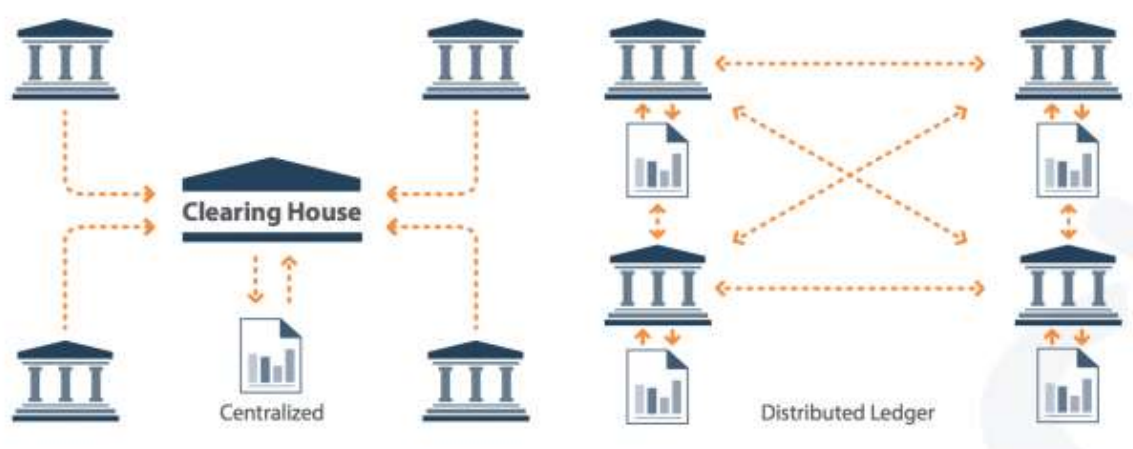
6.2.2 | *Smart Contracts*

Enabling a wealth of ledger functionality and supporting the synchronization of information, blockchain networks use smart contracts. They can also be used to automate specific functions initiated by authorized participants in the network. For instance, via a smart contract, it is possible to (re)calculate shipping charges contingent upon how fast a shipment arrives. After both parties have agreed to the terms posted to the ledger, funds can automatically change hands upon receipt of the item.

6.2.3 | *Consensus*

This is a collaborative process that keeps transactions within the ledger up to date across the blockchain network. Consensus ensures that only those transactions that have been made by authorized participants is synchronized in a chronological fashion.

Figure 4: *A central record book versus a distributed record book*



Adapted from Koetsier (2017)

6.3 | Facilitating Trade Finance Through Blockchain

Due to the transparency offered by blockchain ledgers, effective monitoring of performance and outcomes can be achieved in supply chain management (Koetsier, 2017). Trust is garnered among suppliers and other network participants due to the ability to track progress, shipment and deliveries. Transactions are more cost effective as well as efficient due to not needing auditors as go-betweens. Real-time verification can be performed by individual importers/exporters (Kshetri, 2018).

Credit risk mitigation and liquidity are major concerns in local and cross-country trade financing. Services currently being offered by FIs lack efficiency and are unscalable via contemporary technologies. Current FI systems for the management of working capital and trade finance are inflexible, carry high overheads, not as automated and relatively obscure (Belin, 2019). Paper-based processes and such systems are outdated and in need of technological advancement and digitized solutions. Blockchain can greatly facilitate today's trade financing needs, especially that of SMEs in the Gulf region, as well as the rest of the world. As aforementioned, blockchain technology offer many benefits in general. For trade finance however, these benefits can be categorized into security, transparency, traceability, auditability and efficiency (Belin, 2019).

6.3.1 | Security

Independently verified cryptography is used to match each transaction on the trading network. This allows the secure sharing of trade data since information can be authenticated with ease between the various FIs.

6.3.2 | Transparency

Commercial agreements can now be linked to detailed transactions recorded via the blockchain technology thereby enhancing trust. More trade financing options can be devised as well since risk is reduced by the visibility of transactions and information surrounding them.

6.3.3 | Traceability

Goods and other asset types can be tracked easily, even revealing exact locations within the chain thanks to blockchain technology. Information associated with the asset can be communicated to/from new vendors for follow-up.

6.3.4 | Auditability

Assets traded on the network now have unmodifiable audit trails for life since each transaction is recorded in a sequential and indefinite manner. As a result, compliance costs are greatly reduced, and said assets can be authenticated easily.

6.3.5 | *Efficiency*

Trade finance processes are streamlined significantly better since there is no longer any need for intermediaries. Transactions are made digitally between relevant parties directly. Commercial transactions can also be triggered autonomously via the use of smart contracts initiated by members of the blockchain network. Transactions are therefore swifter and trade process much more cost-effective.

6.4 | **Blockchain-Based Financial Instruments**

Shortcomings of traditional trade finance have encouraged IT companies, fintech startups and FIs to explore how blockchain can be utilized in trade financing for SMEs and larger companies. Blockchain and its individual elements are considered as remarkable tools in the enhancement of trade finance transactions and security that were previously stifled by traditional methodologies. Blockchain technology can be used in an effort to provide importers (and exporters for that matter) with cost and time efficient supply chain financing. The DLT integration allows trade participants access to a more secure exchange of documents, assets and payments without the need for third parties and compliance vetting (Hofmann *et al.*, 2017). KYC (or know your client) requirements are also greatly simplified with the use of DLT according to Martinelli and Smith (2015). In this section, we take a closer look at how inventory, purchase order and receivables financing would operate using blockchain technology and provide a discussion of some of the advantages they would have over the traditional method of financing these instruments.

6.4.1 | *Inventory Financing*

This type of financing pertains to merchandise that has already been manufactured/completed. The merchandise is then used as collateral to secure funds (or sold and then repurchased) for the duration of the transaction (Bryant and Camerinelli, 2014). This type of funding is heavily reliant on when and how the goods are warehoused and possess several risks for FIs or the chosen financier. Warehouse receipts are first issued by a designated inspection company¹ once a physical audit is conducted, inspecting inventory quantity and quality.

However, there are specific warehousing and storage standards that need to be met. Moreover, since multiple parties are usually involved in such transactions, there is a high possibility of fraud with regards to forged/misleading documentation which can mean that the wrong amount (or even non-existent) merchandise is being financed by the FI/financier (Hofmann *et al.*, 2017). In some cases, double financing can occur, wherein the same goods are intentionally reused as

¹ This can be either a Stock Monitoring Agreement (SMA) or Collateral Management Agreement (CMA)

collaterals to embezzle funds from other financiers simultaneously². Additional costs must be incurred to ensure that proper reconciliation of warehoused goods and ledgers versus submitted documents is conducted. The risks associated with human error / deceitful behavior makes inventory financing is a good candidate for some of the features and innovation that blockchain can offer.

Genuine warehousing statuses and receipt data can be maintained through the use of blockchain-based activities registries. Risk of fraud, double financing and other issues can be avoided using the technology since a wider audience of users (such as customers authorities, FIs/financiers and other interested parties) would be connected to the network and eliminating the need for third-party involvement. Document storage and exchange is done on a DLT using cryptographic signatures and registration (Hofmann *et al.*, 2017). The DLT would also help participants keep track of merchandise ownership³, effectively notifying all network participants that a sale/financing transaction has occurred. Merchandise registered on the distributed ledger can initiate smart contracts that has embedded financing agreement terms thereby automating payment once delivery is complete for instance. It is important to note however, that the inventory in question must be tagged accurately so that its digital representation on the network is in fact valid. Smart tags and other IoT innovations (identified in section 6.2) link nicely to blockchain supply chain financing in such scenarios.

6.4.2 | *Purchase Order Financing*

Under this mode of SCF, purchase orders (PO) are financed directly to the supplier even before merchandise is shipped. According to Byrant and Camerinelli (2014), such funding is required to cover a company's needs relating to working capital (i.e., wages, raw material, packaging and other order-related costs). PO financing can leverage the creditworthiness of the buyer (if they are large) but is still required to be able to perform the order against the PO in the first place. This requires the use of third-party intervention by way of financial instruments such as LCs to secure both the manufacturing side for the supplier as well as in any scenario where the buyer may be unable to pay once merchandise is delivered (Hofmann *et al.*, 2017). Moreover, being able to identify all supply chain participants and up-to-date information where the shipment has reached is a

² The 2014 scandal involving a Chinese mining company and the Qingdao port is a good example.

³ According to Hofmann *et al.* (2017), food commodities have been transferred successfully in the case of Kynetix (an advisory firm based in the UK) using a blockchain platform combining these DLT elements.

complicated, time-consuming process and usually requires the engagement of third-party logistics companies (further adding to expenses).

With the use of blockchain technology, PO data can be linked to specific trade documents via cryptographic signatures that several parties within the supply chain are able to easily identify. Challenges with authentication of trade documents by financiers or verification of the existence of a buyer then become nonissues. DLT here increases efficiency, lowers cost as well eliminates the need for additional third parties responsible for auditing and shipment tracking. The risk of double-financing POs is also avoided because of the clear registration of a PO at every stage (i.e., manufacturing-shipment-delivery). Each PO has a unique hash/code that can be traced to every linked financing transaction (Hofmann *et al.*, 2017). Again, as with blockchain-based inventory financing, use of smart devices or IoT technologies makes physical tracking of merchandise through the supply chain an easy task, with all movement registered on the shared ledger.

Data for the chain of custody of the merchandise is readily available thanks to the DLT, making customs checks faster since authorities will have access to a record of all interactions by any party along the supply chain. Smart contracts in tandem with blockchain consensus protocols, can also be used for PO financing to automatically trigger payments once delivery is registered on the chain and pre-agreed upon terms have been met. This therefore eliminates costly issuances of LCs⁴ and mitigates the usual risks related commercial/financial transactions in such scenarios (Hofmann *et al.*, 2017).

6.4.1 | *Receivables Financing*

This type of financing occurs downstream in the supply chain and is related to invoice-based financing instruments that cater to suppliers. The receivables of the supplier (expecting to be paid) are sold to another party or financier without the need to inform the buyer. Factoring and forfeiting are also part of this category of financing which -- according to Hofmann *et al.* (2017, p.83) -- make up about “80% of the SCF invoice-based market”. The creditworthiness of the supplier and the buyer needs to be evaluated by the financier so that pricing can be established. Physical merchandise inspections (via sampling) need to be commissioned by the financier to ensure that financing is not being done under false pretenses / leave the financier liable for losses. According to Byrant and Camerinelli (2014), since invoices are presented before shipment has actually taken place, financiers cannot fully assess issues with performance risk. Moreover, financiers may not be aware of (any) credit notes that may have been issued along with the invoice

⁴ Blockchain-based letters of credit (LCs) are elaborated on in section 6.4.2

or disputes between the parties involved in the transaction. In some cases, there is a risk of fraudulent invoices that have falsified amounts or nonexistent debtors as well as the common risk of an invoice being financed more than once.

Blockchain-based receivable financing offers the necessary solutions to address risks associated with such traditional instruments. As with PO financing, DLT registration of invoices provides safeguards against double-financing issues through the use of unique identifiers⁵, hashed and time-stamped. Any attempt to resell an invoice would be easily thwarted since all parties would be able to see historical instances of financing related to a unique invoice identifier (Hofmann *et al.*, 2017). Blockchain technology therefore improves the reliability of such invoices/receivables and can allow them to be used as collaterals since they are more valuable as a result.

6.4.2 | *Blockchain-based Letters of Credit*

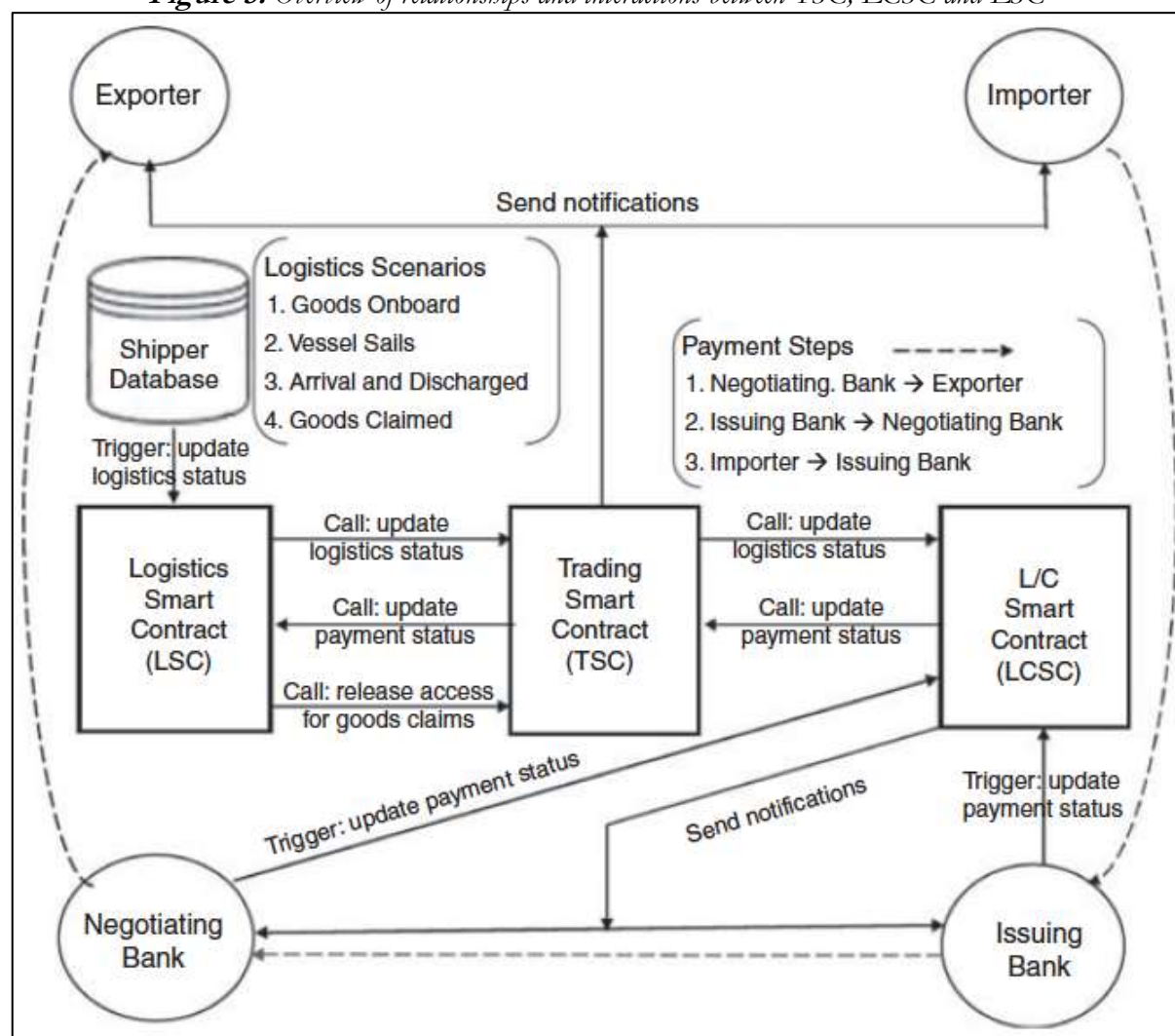
Since LCs are among the most common traditional financial instrument currently in use for international trade, it is worthwhile to examine how blockchain-based solutions would enhance the instrument, according to recent scholarship. For one, traditional trading contracts are vulnerable to tampering and other malicious alterations. These issues can cause severe disputes and disruptions at certain points of trade cycle. Other problems lie in the need to presence physical bills of lading (BLs) once cargo shipments have been dispatched so that payment claims can be made. BLs then need to be forwarded (by the advising FI) to the negotiating FIs so that reimbursements can be made. Depending on the locations of these parties, this process can take up to several days and increase costs thereby. Furthermore, importers can face demurrage charges if documents arrive (late) after a shipment has docked at a port. This current process is expensive and heavily dependent on manual paperwork, emails, faxes and various other information transmissions to confirm the different stages of the trade process. Chang, Cheng and Wu (2019) propose designs for three types of smart contracts that would streamline trading, LC and logistics processes.

A **LC Smart Contract** (LCSC) would work in conjunction with the *Trading Smart Contract* (TSC) and *Logistics Smart Contract* (LSC) as can be seen in Figure 5. Trading terms and agreements are established in the contents of the LCSC which shares information and update statuses with the other smart contract types. FIs that may be involved in the trade can then use the LCSC to more easily track transaction progress. The LCSC would also void the need for BLs and greatly lessen

⁵ According to Hofmann *et al.* (2017), details of the underlying invoice can still remain confidential (if necessary) since hashes comprise of a code/string of characters.

the costs and risks associated with LC or BLs transmission (Chang *et al.*, 2019). The LCSC would also have unique digital signatures from parties involved in the transaction such as an advising bank or importer. When an LC issuance is applied for, an LCSC would be generated by an issuing bank once said digital signatures have been authenticated. The use of a consortium is recommended, with importers, exporters and banks in the form of a member database so that credit ratings of these parties can be easily assessed (Chang *et al.*, 2019). Blockchain-based LCs would therefore take the place of traditional LCs and streamline trade processes, payments, verifications between parties. The use of smart contracts would minimize errors due to negligence and increase security.

Figure 5: Overview of relationships and interactions between TSC, LCSC and LSC



Taken from Chang, Cheng and Wu (2019)

6.5 | Blockchain Platforms in Use & Under Development

Several monetary authorities around the world have shown interest in implementing blockchain technology to facilitate better trade finance operations in their territories. The December 2016

launch of the *Digital Trade Chain Consortium* (recently renamed to '*We.trade*') by seven banks was aimed at reducing the risk associated with open account financing (WTO, 2018). This blockchain-based platform is readily seen as an attempt by FIs not to be bypassed by the decentralized nature of DLT and blockchain networks. Built on Hyperledger technology, *We.trade* is 'bank-centric' and now includes nine banks in 11 countries across Europe. Importer/exporters register to use the platform through their banks. Once settlement conditions, payment terms, prices for goods have all been agreed upon, traders can then record transactions. Automatic settlement is made when pre-determined delivery conditions have been met via smart contracts. However, in this case, payments can be made either via open account means, or through bank guarantees (such as Bank Payment Undertakings also known as BPUs)⁶.

Perez (2017) reports that Hong Kong unveiled a blockchain-based platform for trade finance in March 2017. Around the same time, Singapore began work with the IBM Centre for Blockchain Innovation for the development of blockchain-based applications to enhance trade finance efficiency (IBM, 2016). Both monetary authorities announced joint efforts in November 2017 to lay groundwork for a network infrastructure that would enable cross-border trade financing and digital trade between the two countries.

There are several other instances of cross-border partnerships looking to develop blockchain-based platforms to ease trade financing between importers and exporters. For instance, Chinese conglomerate '*Sichuan Hejia*' and Indian manufacturer '*Mahindra*' partnered up with IBM for the development of supply chain financing solutions using blockchain. Meanwhile, '*Dianrong*' (an online Chinese marketplace lender) and a Foxconn subsidiary joined forces to launch a platform called '*Chained Finance*', also in March 2017, that purportedly has the potential to triple finance access for suppliers in the global market. Other partnerships include Hitachi and Mizuho Financial Group, the '*MarcoPolo*' platform and Massachusetts Institute of Technology start-up called '*Eximchain*'.

6.6 | Challenges Facing Blockchain In Trade Finance

Currently, a major hurdle in the acceptance and implementation of blockchain has to do with law. An absence of legal frameworks that expound on the status of digital documents, which rules to enforces when smart contracts are involved as well as the liability of participants at various stages of the trading process. International laws governing the use of smart contracts in facilitating LCs are still in need of development. Legal issues such as these are the main reason why some FIs have

⁶ *We.trade*'s first operation commenced in July 2018 wherein five major banks and 20 companies were involved.

not yet agreed to commit to the participation or development of blockchain-based supply chain solutions. Despite all the drawbacks of traditional LCs, the legal protection they offer is still considered useful. Fortunately, initiatives to ratify needed legal frameworks are already underway by the International Organization for Standardization (ISO) and the ICC (WTO, 2018).

Nevertheless, the success of blockchain-based solutions in trade finance is highly dependent on the level of interest from importers and other SMEs. Companies need to visualize potential benefits that can be obtained by subscribing to new technologies in their trading activities. This usually involves cost-benefit analyses that need to yield enough incentive to depart from traditional trade financing tools.

Furthermore, regulatory authorities need to play their part in accepting the digitization of all aspects of trade, if not immediately internationally, at least locally. Doing so would allow stakeholders to tap into the full potential of blockchain and related solutions. However, as Hofmann *et al.* (2017) points out, there is still no dominant DLT design that mainstream trade economies have adopted. This is due to ongoing debates and discussion on the use of private versus public DLT iterations.

For blockchain literature, this means that a lot of assumptions are made for what is essentially a rapidly changing technology. More proof-of-concepts are needed so as to push trade finance innovations to the forefront. Blockchain-based instruments differs from past attempts at digital trade due to the universe of stakeholders that can benefit from successful implementation. They include FIs, logistic providers, customs authorities, regulators as well as the isolated importer. Proper backing from these stakeholders can mean the transformation of new blockchain-based solutions from concept to reality.

7 | CONCLUDING REMARKS

Traditional trade finance is currently undergoing a rapid transformation thanks to technological innovations linked to blockchain-based instruments. Companies around the world are looking to the blockchain to see how it can help them streamline their trading. The financial authorities and legislatures of respective countries are encouraging research on how to implement blockchain based trade financing in their markets.

In the case of Qatar, there is still an absence of policies pushing for the use and development of such instruments. As a result, FIs in the country have not been actively pursuing new avenues for importer/exporter financing and rely on their albeit digitized trade platforms, to conduct traditional financing services. This puts importers and other SME start-ups at the mercy of capital

they are able to raise on their own or credit lines they can establish through rapport with suppliers/clients. Often this can result in the closure of businesses within the first or second year due to inability to breakeven against high operating costs.

On a positive note, however, research into how blockchain-based financial instruments can be used in the Qatari context is gaining traction. In order to encourage investors and various other supply chain participants, the development of a specialized platform (similar to the aforementioned consortium) is desirable and should include importers, manufacturers/supplier and (perhaps initially) local FIs.

As can be seen in this paper, blockchain-based solutions provide better efficiency in terms of cost and time consumed and security for trade processes. Further research on such initiatives can produce new trade financing tools that help close the trade finance gap that exists in the Gulf and diversify Qatar's future economy.

ACKNOWLEDGEMENTS

This white paper was made possible by NPRP Cluster grant # 11C-1229-170007 from the Qatar National Research Fund (a member of Qatar foundation). The opinions expressed and statements made in this paper are those of the authors(s) and are not intended to represent the positions or opinions of the Qatar Foundation or its members.

REFERENCES

- Ash, C. (2018) “Fostering growth; the evolution of trade finance in the Middle East”, *Cash Trading Magazine*, available at: <https://www.cashandtrademagazine.com/press-releases/fostering-growth-the-evolution-of-trade-finance-in-the-middle-east/>
- Asian Development Bank. (2017). 2017 Trade Finance Gaps, Growth, and Jobs Survey. <http://dx.doi.org/10.22617/BRF178995-2>
- BBC News. (2017, July 19). Qatar crisis: What you need to know. <https://www.bbc.com/news/world-middle-east-40173757>
- Belin, O. (2019), “How trade finance will benefit from blockchain”, *The Global Treasurer*, available at: <https://www.theglobaltreasurer.com/2019/02/27/how-trade-finance-will-benefit-from-blockchain/>
- Bryant, C., & Camerinelli, E. (2014). Supply Chain Finance - EBA European market guide (Version 2.0). In *Report* (Issue June).
- Chang, S. E., Chen, Y. C., & Wu, T. C. (2019). Exploring blockchain technology in international trade: Business process re-engineering for letter of credit. *Industrial Management and Data Systems*, 119(8), 1712–1733. <https://doi.org/10.1108/IMDS-12-2018-0568>
- Cole, R., Stevenson, M., & Aitken, J. (2019). Blockchain technology: implications for operations and supply chain management. *Supply Chain Management*, 24(4), 469–483. <https://doi.org/10.1108/SCM-09-2018-0309>
- Conn, C., Hazen, J., & Hoffman, G. (2009). Shift from Letters of Credit to Open Account using Electronic Supply Chain Management Tools. *Association for Financial Professionals Annual Conference*.
- European Commission and European Central Bank. (2020). Survey on the access to finance of enterprises, October 2019 to March 2020. https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html
- Hofmann, E., Strewé, U. M., and Bosia, N. (2017), *Supply Chain Finance and Blockchain Technology: The Case of Reverse Securitisation*, Springer.
- International Chamber of Commerce. (2020). *2020 ICC Global Survey on Trade Finance*. <https://iccwbo.org/publication/global-survey/>
- International Monetary Fund. (2019). *Enhancing The Role of SMEs In The Arab World—Some Key Considerations*. Report.
- Koetsier, J. (2017). Blockchain Beyond Bitcoin: How Blockchain Will Transform Business in 3–5 Years. June 14 <https://www.inc.com/john-koetsier/how-blockchain-will-transform-business-in-3-to-5-years.html>.
- Kshetri, N. (2018), “1 Blockchain’s roles in meeting key supply chain management objectives”, *International Journal of Information Management*, Vol. 39, pp. 80–89.
- Mainelli, M., & Smith, M. (2015). Sharing ledgers for sharing economies: an exploration of mutual distributed ledgers (aka blockchain technology). *Journal of Financial Perspectives*, 3(3), 38–58.
- MarcoPolo. (2020, February 26). *The Evolution of Trade Finance: Blockchain Signals New Era*. <https://www.marcopolo.finance/evolution-of-trade-finance-blockchain/>
- Perez, B. (2017), “Hong Kong’s monetary authority unveils trade finance platform based on blockchain technology”, *TheStreet*. Retrieved from <https://www.thestreet.com/story/14065398/1/hong-kongs-monetary-authority-unveils-trade-finance-platform-based-onbitcoin-tech.html>
- Smyth, M. (2010). *The Need for Supply Chain Finance in the GCC*. Tawreeq Holdings. <http://tawreeqholdings.com/en/press-releases-and-news/the-need-for-supply-chain-finance-in-the-gcc/40>
- Sawashe, S. (2019), “Blockchain For Letter of Credit”, *Altcoin Magazine*, available at: <https://medium.com/the-capital/blockchain-for-letter-of-credit-319436c63bc1>
- World Bank. (2020). *SME Finance*. <https://www.worldbank.org/en/topic/smefinance>

World Trade Organization. (2018). *World Trade Report 2018: The future of world trade - How digital technologies are transforming global commerce*. https://www.wto.org/english/res_e/publications_e/wtr18_e.htm

Yang, C.-S. (2019), “Maritime shipping digitalization: Blockchain-based technology applications, future improvements, and intention to use”, *Transportation Research Part E: Logistics and Transportation Review*, Vol. 131, pp. 108–117.

AUTHOR BIO

ⁱ **Lanouar Charfeddine** is an Associate Professor at the Department of Finance and Economics in the College of Business and Economics at Qatar University. Dr. Charfeddine holds a PhD from University Pantheon Assas, Paris II, France. During the 5 past years, he has published more than 30 articles in international peer-review journals including and not limited to *Tourism Management*, *Accident Analysis & Prevention*, *Energy Economics*, *Energy Policy*, *Economic Modelling*, *Journal of policy Modelling*, *Emerging Market Review*, among many others. Dr. Charfeddine is also editor and reviewer in some international journals. **E-mail** : lcharfeddine@qu.edu.qa

ⁱⁱ **Mohamed Umlai** is a PhD candidate in Business Administration with a finance specialization at the College of Business and Economics at Qatar University. Mr. Umlai works as a part-time Research Assistant has published in *Journal of Accounting and Organizational Change*. His research interests include public sector accounting, accounting education, shariah compliance and trade finance. **E-mail** : mumlai@qu.edu.qa