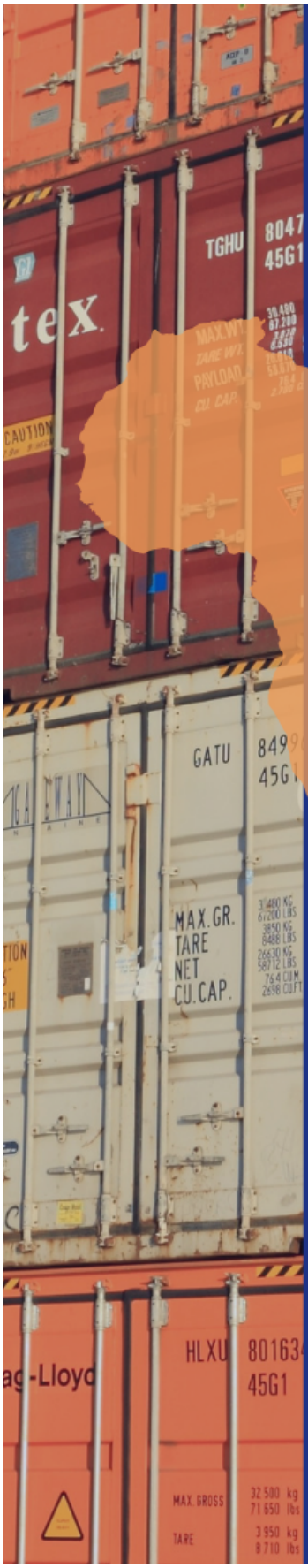


UNIVERSITY OF OTTAWA
TRADELAB PROJECT

Understanding Trade Rules in the Digital Age

How technology can facilitate user engagement with trade agreements

PROPOSED BY

Isaac Turner, James Moores, Jamie Orr
Mentor: Dan Ciuriak
Supervisor: Professor Wolfgang Alschner

PROPOSED TO

TRALAC
April 30, 2019

Table of Contents

List of Abbreviations

AfCFTA	African Continental Free Trade Area
ASYCUDA	Automated System for Customs Data
AU	African Union
FTA	Free Trade Agreement
GMSA	Groupe Spéciale Mobile Association
ITU	International Telecommunication Union
LDC	Least Developed Countries
MSME	Micro, Small, and Medium-Sized Enterprise
REC	Regional Economic Community
SME	Small and Medium-Sized Enterprise
SMS	Short Message Service
TFA	Trade Facilitation Agreement
UNCTAD	United Nations Conference on Trade and Development
USSD	Unstructured Supplementary Service Data
WCO	World Customs Organization
WTO	World Trade Organization

Executive Summary

Trade agreements are often written in language that users cannot understand without guidance from trade experts. This language creates a knowledge-based trade barrier. The objective of this TradeLab project is to explore how technology can be used to make trade agreements more accessible so that those with and without expertise can more effectively engage with them.

This report assesses the state of cross-border trade of goods in Africa and recommends specific technology that can be applied to lower transaction costs. Each type of technology that is discussed addresses at least one of the following issues identified in African trade:

1. **Overlapping Trade Agreements:** 39 out of 54 countries in Africa are members of more than one of the eight AU-recognized RECs. These RECs operate in conjunction with other trading arrangements (e.g. regional agreements that are not AU-recognized, bilateral agreements, etc.) and further complications can arise by virtue of the fact that trade agreements are negotiated internationally but implemented domestically. This overlapping membership and distinction between international and domestic law can make it difficult for users to know their respective trading rights and obligations. For example, traders in some countries may need to navigate different sets of rules with regard to the same product when exporting to certain destinations. Technology could help to address these problems by giving users effective tools for identifying the rules that apply to their respective trade-related activities.

2. **Lack of Transparency in Trade Facilitation:** Manually enforcing customs processes at individual border agencies can lead to unequal treatment of similar goods and increase the risk of corruption. Traders need to ensure certainty before crossing the border. This point is especially true for small firms that cannot afford to pay unexpected customs fees or bribe border agents. Automation can help reduce these risks through improved record-keeping, auditing and online preclearance platforms. This, in turn, will limit discretion in border regulation and allow all parties in the trading process to have access to all the same information.

3. **Slow & Redundant Customs Processes:** In Africa, document requirements are disproportionately time-consuming and expensive by comparison to the rest of the world. Regional trading blocs, different customs regimes, and expensive procedures all contribute to this inefficient and slow system. Digital tools can help to eliminate redundant administrative tasks (e.g. multiple and similar paper forms filled out by hand) and, by extension, help to increase the flow of goods across borders.

4. **Technology Restraints:** Telecommunication infrastructure in Africa varies greatly from country to country, and the prevalence of high speed broadband internet varies geographically as well. However, the rate of cell phone ownership across the continent is consistently very high. This means that technology which uses or can be adapted to use cell phones should be strongly considered, and internet-based programs (which allow for greater connection and user-interaction) can be explored for the future.

We separate our recommendations for digital tools based on three types of users that interact with trade agreements: traders, border agents, and policymakers. Each of these users have different purposes for interacting with trade agreements, face different challenges, and in turn, require different technology to solve them. For each category, we have identified several use cases and digital tools that can offset the four issues listed above.

a. **Traders:** Traders need to understand their rights and obligations under trade agreements (whether multi- or bilateral) to be able to benefit from them. Digital tools can be used to help clarify the rules set out in agreements, but the use of these tools is dependent on the technological infrastructure of any given country. Technology such as M-Pesa (mobile banking) and BitPesa (currency exchange/remittance using bitcoin) have disrupted conventional banking in many African regions, and their technology could be transferable for trade purposes. If current web portals such as the Canada Tariff Finder could be modified to work with USSD and SMS technologies (that do not require mobile data), trade information could be more easily accessible to traders.

b. **Border agencies:** Trade agreements are negotiated at the international level; however, the rules for trade are implemented domestically by way of domestic legislation. Thus, individual agencies need to understand how to facilitate trade under a national legal mandate and domestic regulations. The automation and standardization of customs platforms can increase efficiency, ensure uniform treatment of customs regulations, and involve all parties (e.g. traders, border agents, regulatory ministries) in a single window format. In addition, the use of blockchain and codification of agreements has the potential to take automated facilitation one step further and decentralize the regulation process.

c. **Policymakers:** When negotiating new trade agreements, policymakers must consider a multitude of factors for the benefit of their national economy. One such factor is the impact of previous agreements. To assess this impact, policymakers must work with, research, and distill large amounts of complex text. Tools that enhance policymakers' ability to analyze these texts in preparation for trade negotiations and to help predict the impact of possible negotiated outcomes could both improve quality of work and reduce preparation costs. These tools can range from websites that enable users to compare text

across agreements, to AI that can be taught to answer specific questions and make predictions about the economic impact of new agreements.

The recommendations made in this report revolve around current and growing digital infrastructure. In the short term, it would be most beneficial to create trade programs that use SMS/USSD technology because of the existing infrastructure of cell phone towers and feature phones. However, as smartphones become increasingly popular in African markets, digital trade programs should be incorporated using internet- and blockchain-based technology.

Scope
The digital tools discussed in this report address the cross-border trade of goods. While it is possible for technology to be used in other areas (e.g. trade in services), this would be beyond the scope of our work and should instead be considered for a future TradeLab project. Future TradeLab projects could also focus on one of the digital tools below, and do further research on the following: ● Optimal level for implementation (national, bilateral, regional); ● State-specific implementation strategies (current infrastructure, training, costs); and ● Legal and intellectual property concerns with new technology.
Disclaimer
The digital tools identified in this report are not applicable to all African trade-related issues. The objective of this paper is to outline technology that can reduce knowledge-based trade barriers by better connecting traders, border agencies, and policymakers to trade agreements. As a consequence, the technology identified in this report does not directly address: ● Supply and demand issues for African traders; ● The discrepancy between intra-African and inter-African trade;[1] or ● The diversification of African exports, which, on average, are currently concentrated in very similar primary products.[2]

[1] Mariama Sow, "Figures of the week: Africa's intra-and extra-regional trade" *Brookings Institution* (March 2018).
[2] United Nations Economic Commission for Africa, "Chapter Seven: Movement of Goods and Services in Africa" in *Assessing Regional Integration in Africa V* (2012) at 119 [UNECA].

Introduction

From e-commerce platforms to cryptocurrency, the digital world of trade continues to grow at an exponential rate. Despite these advances in technology, however, trade agreements and regulations have not conformed to the digital age. Traders, customs agencies and policymakers still engage with trade agreements in much the same way as they did in the 20th century.

Trade rules are still written in complex language that can be difficult to understand. In addition, knowledge-based barriers to trade are only increasing. As the rules for international trade evolve to include new issue areas and the number of trade agreements increase, it becomes more-and-more challenging for policymakers, border agencies and traders to be completely aware of their rights and responsibilities in the trading process. Currently, intermediaries (i.e. trade experts) are the solution to this knowledge barrier; however, intermediaries require extensive training and increase transaction costs for all parties that rely on them. By making trade agreements more accessible through technology, the intermediaries would factor into the process to a lesser degree, and thus trade agreements would be "disintermediated."

This report is a scoping paper; it will identify types of technology that could be used to address the challenges that those who engage with trade agreements face in the African context ("use cases"). The nature of these use cases will be illustrated with reference to specific tools that either exist or are under development. Looking forward, we would suggest that if Tralac would like to advocate for the implementation of any of these technological tools, this would be a good opportunity for future TradeLab groups to further explore these specific areas.

The objective of this research paper is to identify technology that could help international trade regulation to enter the digital age and have the greatest positive impact on trade in Africa. To meet this objective, this paper is divided into three sections. The first section describes the

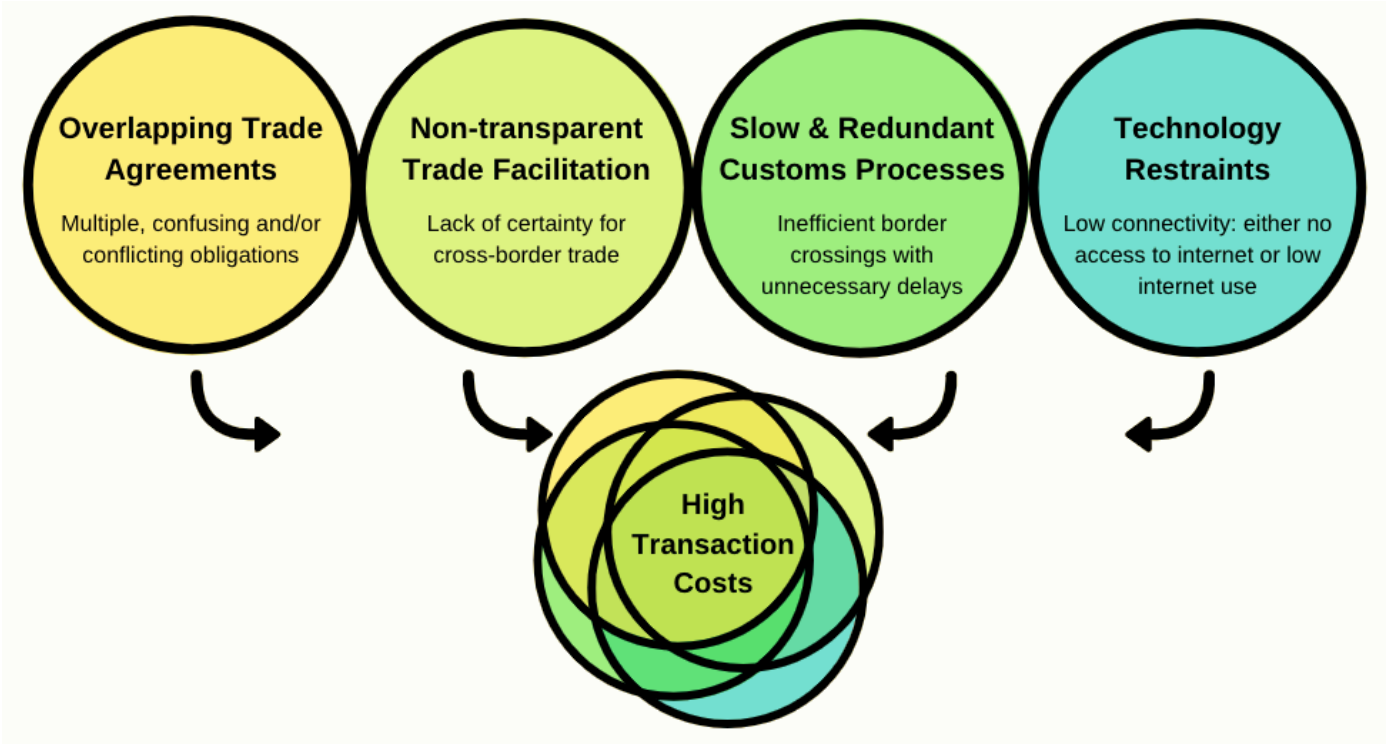
main problems that technology should address. To outline these issues, we explore the state of trade and technology in Africa. The second section explores various use cases that have the potential to provide solutions for the issues that are highlighted in section one. These cases are divided into three user groups: traders, border agencies, and policymakers. The third, and final section, makes recommendations on the technology that could be adopted to improve trade in Africa over the short, medium, and long term.

1. Background: Trade Issues for Technology to Address

According to the WTO, merchandise imports and exports in Africa accounted for a meagre 3.0% and 2.4% of world trade in 2017.[3] Intra-African trade is also low in comparison to intra-regional trade in most other parts of the world, and accounted for only 19.6% of total African trade in 2016.[4] While many contributing factors are beyond the scope of this paper (e.g. supply and demand issues), one key factor that contributes to these poor results is disproportionately high transaction costs. These transaction costs take various forms, including but not limited to, the fees charged by trade experts for their professional opinions, overtime wages during processing delays, or even bribery payments at border crossings.

[3] World Trade Organization, "V: Global perspectives - who are the leading players?" in *World Statistical Review* (2018) at 78.
[4] *Ibid* at 79.

Accordingly, the first section of this report outlines the following four main issues that contribute to high transaction costs in African trade:



1.1 Identifying obligations within overlapping trade agreements

Past economic integration in Africa has centred on the eight African Union-recognized RECs.[5] 39 out of 54 countries in Africa are members of more than one of these RECs. Burundi, Democratic Republic of Congo, Djibouti, Eritrea, Libya, Uganda, and Sudan are each members of three of these RECs. Kenya is the only country with four REC memberships. The extent of this overlap is represented

[5] African Union, "Regional Economic Communities" (accessed April 2019).

in Figure 1 below. These RECs operate in conjunction with other trading arrangements (e.g. regional agreements that are not AU-recognized, bilateral agreements, etc.). Moreover, while trade agreements are negotiated at the international level, the rules agreed to by parties must be implemented at the domestic level. In practice, this overlapping membership and the distinction between international and domestic law can undermine the economic integration that trade agreements seek to achieve because they make it difficult for users to identify their respective trading rights and obligations.

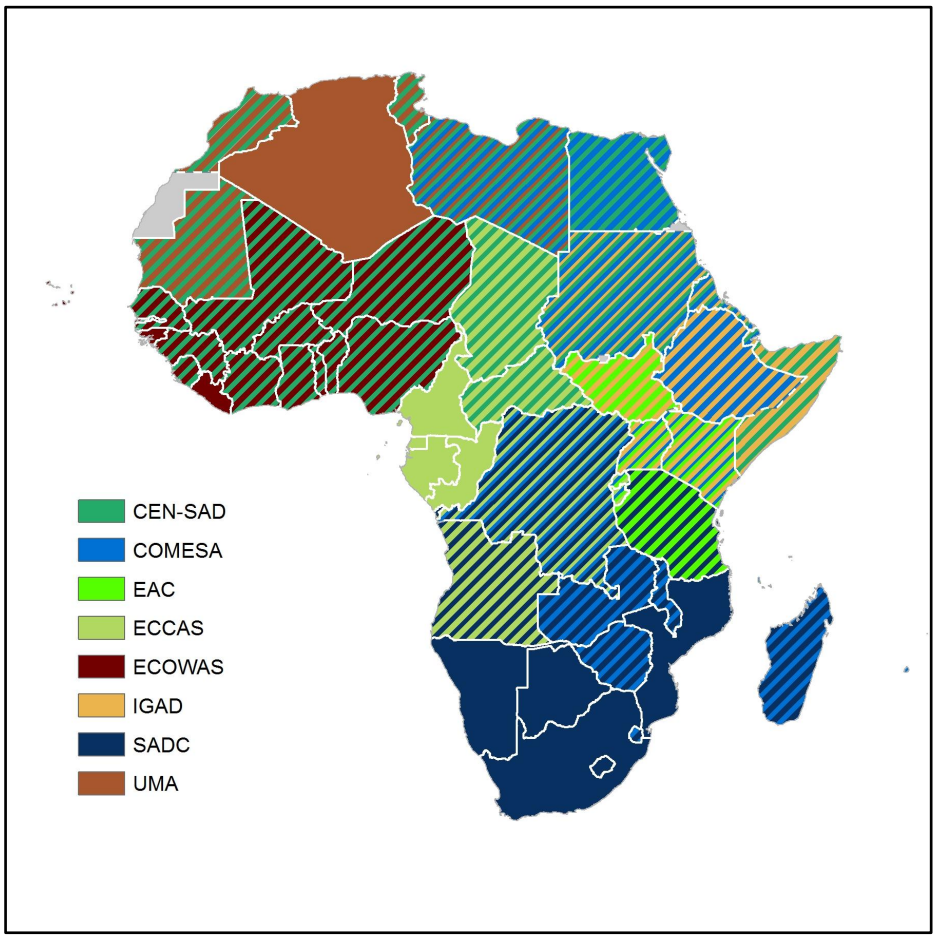


Figure 1: "Regional Economic Communities," *United Nations Economic Commission for Africa* (accessed April 2019).

For example, each REC uses its own rules of origin to grant products qualifying status for preferential treatment.[6] These differing rules mean that for traders living in a country that belongs to several RECs, different sets of rules may apply to the same product when exporting to certain destinations.[7] Accordingly, it may not always be clear for traders which rules are the most favourable in their specific situation, and, where it is clear, traders must either adjust their production processes to meet different sets of rules or not benefit from the preferential treatment that is offered under a given agreement. The problems associated with overlapping trade agreements are not limited to traders; there are also costs for states to manage (and comply with) overlapping commitments.[8]

The new African Continental Free Trade Area agreement (AfCFTA) - once it enters into force - should alleviate some of the concerns about overlap among the RECs.[9] The AfCFTA contains several provisions regarding how the agreement will co-exist with RECs.[10] Specifically, Article 19 dictates that the agreement will prevail over regional agreements except where higher levels of integration have been achieved.[11] In practice, this means that the AfCFTA will create a minimum standard for economic integration, and will reduce, but not eliminate, the problems associated with overlapping membership because the rules for trade from other trading arrangements will continue to apply in some cases.

The technology described in this paper could help to address the confusion caused by overlapping trade agreements by giving users that engage with them effective tools for

---

[6] UNECA, *supra* note 2 at 83.
[7] Gerhard Erasmus, "What will happen to the Regional Economic Communities and other African Trade Arrangements once the AfCFTA is operational?", *Tralac* (11 June 2018) [Erasmus].
[8] Joost Pauwelyn & Wolfgang Alschner, "Forget About the WTO: The Network of Relations between Preferential Trade Agreements (PTAs) and 'Double PTAs'" (30 May 2014) *SSRN*.
[9] The AfCFTA will enter into force 30 days after the 22nd instrument of ratification is deposited with the AU. At time of writing, although 22 countries have ratified, only 19 instruments have been deposited.
[10] Erasmus, *supra* note 7.
[11] *Agreement Establishing the African Continental Free Trade Area*, 21 March 2018 (not entered into force), art 19.

identifying the rules that apply to their respective trade-related activities. While there is no substitution for removing barriers to trade altogether by way of complete integration, supplementary digital tools could be highly effective if they reduce the time and resources that traders, border agencies, and policymakers require to disentangle competing obligations in overlapping arrangements.

1.2 Improving transparency in trade facilitation

The treatment of goods can vary depending on the processing systems and officials at border crossings. Human discretion at border crossings creates inconsistent treatment, and can lead to corruption. Often, non-transparent or hidden trade costs take the form of "gifts, irregular payments for exports and imports, and bribes."[12] If each individual port of entry had the autonomy to charge fees based on their own discretion, traders would not be able to foresee and budget for international costs.

Automating the border crossing process decreases discretion in customs processing because computerized systems produce faster and more consistent results than human workers, and decrease the amount of human interaction between traders and border agencies. A report by the Business Action for Improving Customs Administration in Africa, for example, indicated that Kenya saw significant improvements in the integrity of its customs facilitation after introduction of a customs IT system in 2005.[13]

---

[12] Paloma Bernal Turnes & Ricardo Ernst, "A Framework for Transparency in International Trade" *Investigaciones Europeas de Direccion y Economia de la Empresa* (2015) 21 at 2 [Turnes & Ernst].

[13] Creck Buyonge & Irina Kireeva, "Trade facilitation in Africa: Challenges and Possible Solutions" (2006) 2:1 *World Customs Journal* [Buyonge & Kireeva]. The authors also note: "where corruption is known to be present in

In addition, automated computer systems are an effective way to ensure that national regulations are uniformly enforced at a state's customs agencies. In their 2016 Global Trade Management Survey, Thomson Reuters and KPMG International outlined that many firms engaged in international trade highlighted "several issues related to customs compliance as adding uncertainty to their international operations, including the difficulty of interpreting customs rules across countries and the use of manual rather than automated systems for filing customs documentation."[14]

Equal assessment of goods and services is imperative for predictability and transparency in cross-border trade, and the standardization of record-keeping can help to prevent delays, thereby decreasing the risk of corruptive behaviour.[15] Delays in customs processes, in fact, "increase the likelihood of traders making 'facilitative payments' (i.e. bribes) to customs officials to speed the clearance of their goods through border checkpoints."[16] If bribes become common practice, then traders have less certainty of their exact customs costs before the border.

Further, the same automated customs system can be implemented in numerous agencies, and can even connect border agencies to traders. For example, if governments and border agencies agreed to ensure that tariff rates and trade regulations are promptly published to an accessible web portal, traders would be able to access all information required before crossing

---

the African customs administrations surveyed, it is practically never systemic and well organised and mostly tends to exist at the individual levels rather than institutional. In the future, it may be expected that some form of corruption will continue to exist in Customs, particularly in those countries which cannot afford to pay decent salaries to customs officials."

[14] Thomson Reuters and KPMG International, "2016 Global Trade Management Survey" (2016), at 4-8. See also Tadashi Yasui, "Benefits of the Revised Kyoto Convention" *WCO Research Paper* (February 2010) at 5.

[15] Buyonge & Kireeva, *supra* note 13.

[16] Barka, Habiba Ben. "Border Posts, Checkpoints, and Intra-African Trade: Challenges and Solutions" *African Development Bank* (January 2012) at 4-5 [Barka].

the border. The improved transparency and standardization that this initiative would lead to would have a positive impact on the entire chain of import and exports.[17]

1.3 Increasing efficiency in cross-border trade

Inefficient customs processes - and the delays they create - significantly contribute to two dimensions of import and export costs: inventory-holding and depreciation.[18] A 2010 World Bank report estimated that for a single country, a one-day delay in goods at the border would be equivalent to reducing the country's overall trade by one percent, and six percent with time-sensitive goods.[19]

In their 2004 Trade and Development Report, the United Nations Conference on Trade and Development (UNCTAD) stated that the "average customs transaction [in Africa] involves up to 30 different parties, 40 documents, 200 data elements (30 of which are repeated at least 30 times) and the rekeying of 60–70% of all data at least once."[20] A 2005 World Bank report reaffirmed this statement, adding that "administrative hurdles (e.g. customs and tax procedures, clearances and cargo inspections) contribute to 75% of trade facilitation delays."[21]

Non-tariff barriers (e.g. inefficient customs procedures and inadequate transport and communications infrastructure[22]) continue to prolong customs processes in Africa. A 2016 study done by the United Nations Economic Commission for Africa has shown that the median African

---

[17] Turnes & Ernst, *supra* note 12 at 2.
[18] YueLi and John Wilson, "Time as a Determinant of Comparative Advantage" *World Bank Policy Research Working Paper* (1 November 2009) at 4.
[19] Simeon Djankov et al., "Trading on Time" (June 2006) 92:10 *Review of Economics and Statistics* at 20-21.
[20] Buyonge & Kireeva, *supra* note 13. See also Joann Peterson, "An Overview of Customs Reforms to Facilitate Trade" United States International Trade Commission, *Journal of International Commerce and Economics*, August 2017 at 10.
[21] *Ibid.* Note: numerous complaints for lengthy and inefficient border-crossings are referenced on tradebarriers.org.
[22] *Ibid.*

country's custom processes[23] take 25% longer than the rest of the world.[24] They are also disproportionately expensive: "in 2012, the export of a standard container originating from Africa cost approximately 27 per cent more than the world average – US $1,875 compared to US$1,470 – whilst import was even more expensive – US $2,410 compared to US $1,742.60"[25] (see Figure 2 below). In 2016, Joakim Reiter, the Deputy Secretary-General of the WCO, stated that the cost of trade activity in developing countries is estimated to be 1.8 times higher, on average, than in developed countries.[26]

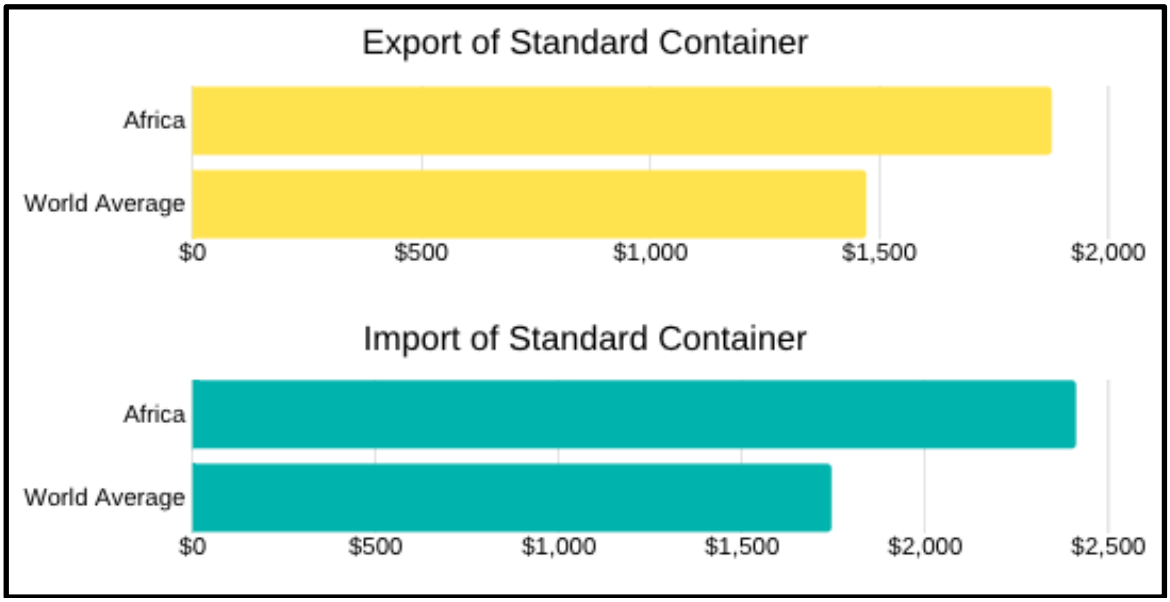


Figure 2. Data source: Geovanni Valensis et al, "The trade facilitation agreement and Africa's regional integration," (2016) 37:2 *Canadian Journal of Development Studies* 239 at 241.

IT systems eliminate many of the issues surrounding inefficient or redundant customs processes. For example, in computer-based systems, traders can input their company information into a database that can effectively copy and paste that information to new forms. This would

[23] Note: in the study, the "customs processes" involve the entire process in which to submit documents; this includes the length of the documents themselves, the process for their completion, as well as their actual submission.
[24] Geovanni Valensis et al., "The trade facilitation agreement and Africa's regional integration," (2016) 37:2 *Canadian Journal of Development Studies* 239 at 241.
[25] *Ibid.*
[26] World Customs Organization, "Statement by Mr. Joakim Reiter, Deputy Secretary-General," 1 June 2016, *UNCTAD Transport and Trade Facilitation Newsletter*, no. 70.

eliminate the need for rewriting or rekeying information into other forms. In addition, storing information in a digital database would allow customs agencies to maintain better recordkeeping, and simplify the process of sending information to the government. This would decrease the number of delays and increase the availability for more trade to flow through the border.

Under the *Trade Facilitation Agreement* (TFA),[27] governments are required to "use technology to create an environment for easier trade and greater transparency."[28] The WTO defines trade facilitation as the "simplification, modernization, and harmonization of export and import processes"[29]and prescribes various measures to "improve transparency and predictability of trading across borders and to create a less discriminatory business environment."[30] A similar objective is found within the revised Kyoto Convention,[31] which outlines that IT systems can help create more efficient border processes:

> [Improved facilitation] is achieved by, for example, the online publication of customs rules and regulations; the streamlining of customs paperwork; the use of electronic platforms for customs filing and clearance; the adoption of risk management tools for customs inspections that separate high-risk (e.g., potentially dangerous or illegal) cargo from low-risk cargo; and coordination between the border management agencies of signatory countries… Using risk management techniques at border crossings reduces bottlenecks at customs checkpoints by limiting physical inspections, allowing customs officials to focus on finding and checking high-risk cargo.[32]

To this point, the WCO's "SAFE Framework" also recommends that customs administrations

---

[27] Protocol Amending the Marrakesh Agreement Establishing the World Trade Organization, Agreement on Trade Facilitation, WT/L/940, 28 November 2014. The TFA was recently ratified by a majority of African countries and in force since 2017. See Talkmore Chidede, "An Update on the WTO Trade Facilitation Agreement and African Countries" (21 February 2019) *Tralac* [Chidede].

[28] *TFA,* preamble.

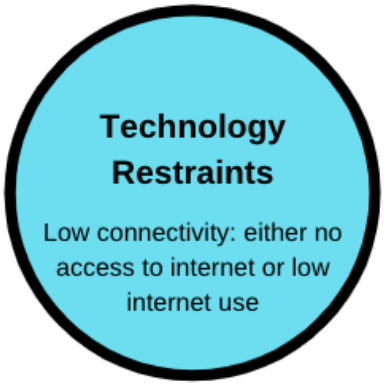
[29] Chidede, *supra* note 27.

[30] Tralac, "WTO's Trade Facilitation Agreement enters into force" (22 February 2017). For similar language, see also Canada Border Services Agency, "Uniform Regulations Chapters Three and Five of NAFTA: Memorandum D11-4-18", 27 Oct 2014. Note: the similar language is found in the uniform regulations of sections III and X of the North American Free Trade Agreement (NAFTA).

[31] WCO, "The Revised Kyoto Convention," 2015.

[32] *Ibid.* See also Organisation for Economic Co-operation and Development, Policy Brief, "The Costs and Benefits of Trade Facilitation", *Paris: OECD* (2005) at 6.

use IT systems to gather, store, and analyze data on high-risk cargo, and that they "require shippers to provide information on imports in electronic format before the items arrive at customs checkpoints to help customs officials assess risk."[33] Thus, automation programs are currently the best tool to improve efficiency in trade facilitation; by streamlining the customs process, certain programs can have an immediate impact to increase the flow of goods across borders.



1.4 Addressing Differing Levels of Technology Infrastructure in Africa

Africa is one of the most diverse continents in the world regarding technology infrastructure. The technology available in some regions would rival the most advanced Western economies and in other parts of the continent, it is relatively undeveloped.[34] Accordingly, some of the use cases in this report are best suited for countries with a high level of digital infrastructure, such as widespread high-bandwidth internet access, and some feature technology that would be appropriate for regions that are more reliant on older technology, such as feature phones (i.e. capabilities are limited to sending and receiving phone calls and texts).

Internet-based communication is preferable when developing technology to understand trade agreements. It allows the developer to have a wider range of possibilities and platforms (e.g. interactive mobile apps or desktop internet browsers) to present their resource to the public.

---

[33] World Customs Organization, "WCO SAFE Framework of Standards" (2018) at 6, 15.

[34] For example, larger centers such as Nairobi and Addis Ababa have access to 4G/LTE technologies, while a majority of the continent is still under 2G coverage. See GSMA, "The Mobile Economy 2019".

However, due to the current technological infrastructure in Africa, technology that uses feature phones must be included in any set of recommendations. Instead of using mobile internet and apps, feature phones use Short Messaging Service (SMS) and Unstructured Supplementary Service Data (USSD) programs, which are more limited to basic send-and-receive forms of communication.[35] These phones are more prevalent than fixed internet access, especially in least developed countries (LCDs). Thus, to determine how technology can help users engage with trade agreements, SMS- and USSD-based programs need to be considered -- at least for the short term -- to ensure that the majority of Africa's population can benefit. .

a) Mobile technology in Africa

According to the Groupe Spéciale Mobile Association (GSMA),[36] approximately half of the African population own cell phones.[37] Many African cell phone users, however, do not use smartphones (see Figure 3 below). Instead, they use feature phones with limited capabilities. The large presence of feature phone in African markets is likely due to limited data infrastructure and/or high data costs,[38] as well as the fact that feature phones are more inexpensive than smartphones.

---

[35] Note: the USSD protocol is understood by any phone that requires a SIM card, which is essentially most of the phones in Africa. See Wiza Jalakasi "How a 20-year Old Mobile Technology Protocol is Revolutionising Africa (With Numbers)", *Medium* (16 May 2018).
[36] The GSMA is an international trade body that represents the interests of mobile network operators worldwide.
[37] GSMA, "The Mobile Economy 2019" [GSMA].
[38] For more information on the cost of mobile data, see Research ICT Africa, "RIA Africa Mobile Pricing Indices Portal" (2019).

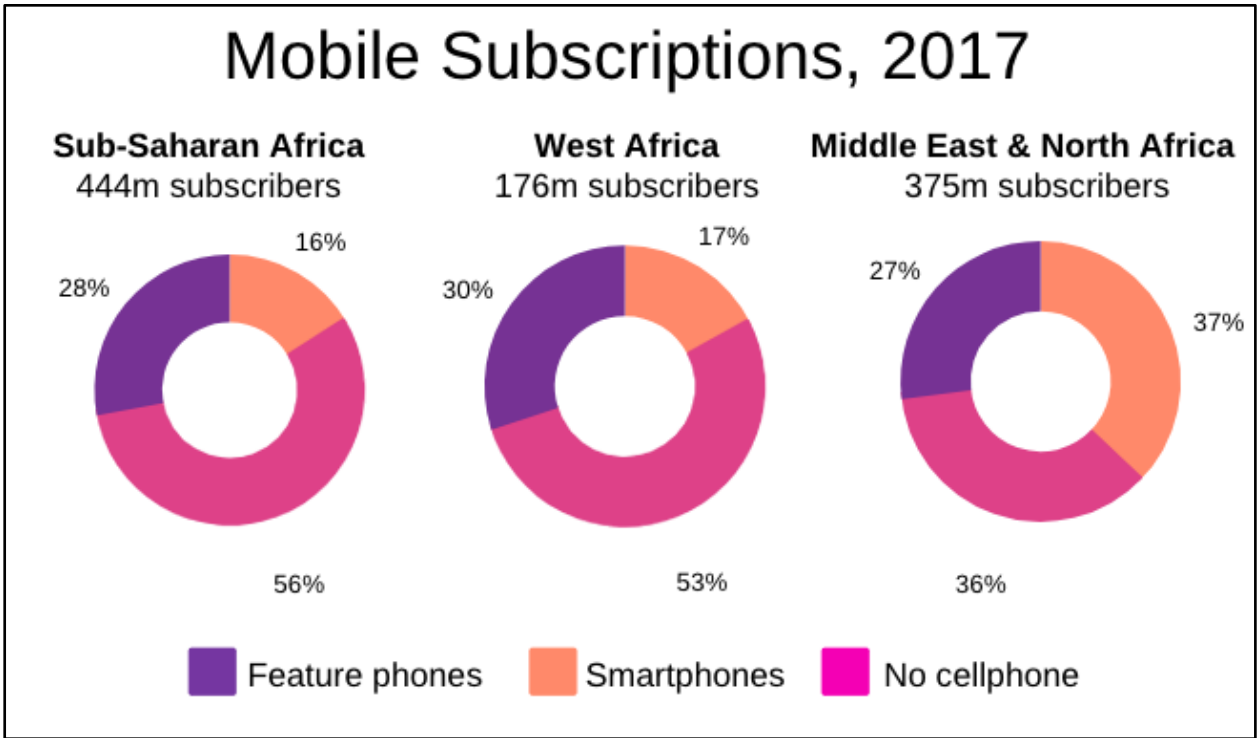


Figure 3. Data source: GSMA, "The Mobile Economy 2019."

Despite feature phones' limited capabilities, however, many African countries have used innovative solutions to solve market issues with feature phones alone.[39] M-Pesa, a popular Kenyan mobile banking system, allows users to store money in a mobile bank account and make secure payments through USSD.[40] This mobile service has lowered transaction costs, which has diminished barriers to other areas of commerce as well. For example, "lenders [can] quickly assess credit risks, insurers [can] sell life and medical cover in small chunks, and new energy firms [can] sell electricity by the day or week."[41] Thus, while data-capable smartphones are capable of executing more complex applications, they are not the only options.

[39] The Economist, "What technology can do for Africa" (2017).
[40] Eleni Mourdoukoutas, "Africa's digital rise hooked on innovation" (2017) [Mourdoukoutas].
[41] ITU, "Report: Roadmap to 5G" (2018); See also Jay Rosengard, "A Quantum leap over high hurdles to financial inclusion: the mobile banking revolution in Kenya" *Harvard UP* at 9.

b) Internet usage in Africa

Internet usage is much less pervasive in Africa than feature phone use. In their 2018 B2C E-Commerce Index, UNCTAD stated that, on average, only 26% of Africans were online.[42] This number varied significantly by country: in South Africa, it was projected that 59% of citizens were online, compared to only 5% in Chad.[43] In contrast, most nations in North America, Europe and Eastern Asia have a much higher percentage of their population online; Iceland's online participation rate, for example, was 98%.[44] In addition, while the ITU's 2017 Facts and Figures report found that LDCs have made "great progress towards achieving universal access and affordability of the internet," current growth rates indicate that less than one-quarter of the population in LDCs will have internet access by 2020.[45]

Mobile apps (using mobile data) in particular will be very useful for the average African trader in the near future (see Figure 4 below). Based on the ever-growing popularity of smartphones, not only is mobile data more portable and less expensive for the consumer, but the infrastructure needed for mobile broadband is less expensive for governments as well. In fact, the ITU found that creating infrastructure to provide data to smartphone users was much cheaper than providing access to WiFi for computers.[46] Since the first submarine internet cables introduced on the continent's coasts in 2002, mobile broadband has become increasingly affordable and reliable; for example, high-bandwidth undersea cables have enabled countries to upgrade from 2G technologies to up to 4G/LTE in places such as Addis Ababa and Nairobi.[47]

---

[42] UNCTAD, "Technical Notes on ICT for Development" B*2C E-Commerce Index 2018, Focus on Africa* (2018). See similar trends in ITU, "Internet Usage in Africa: ICT Facts and Figures" (2017).
[43] UNCTAD, *ibid.*
[44] UNCTAD, *ibid.*
[45] ITU, "4 of 5 People In LDCs Can Access Mobile Networks, But Are Not Using Internet" (2018).
[46] ITU, *ibid.*
[47] Mourdoukoutas, *supra* note 40.

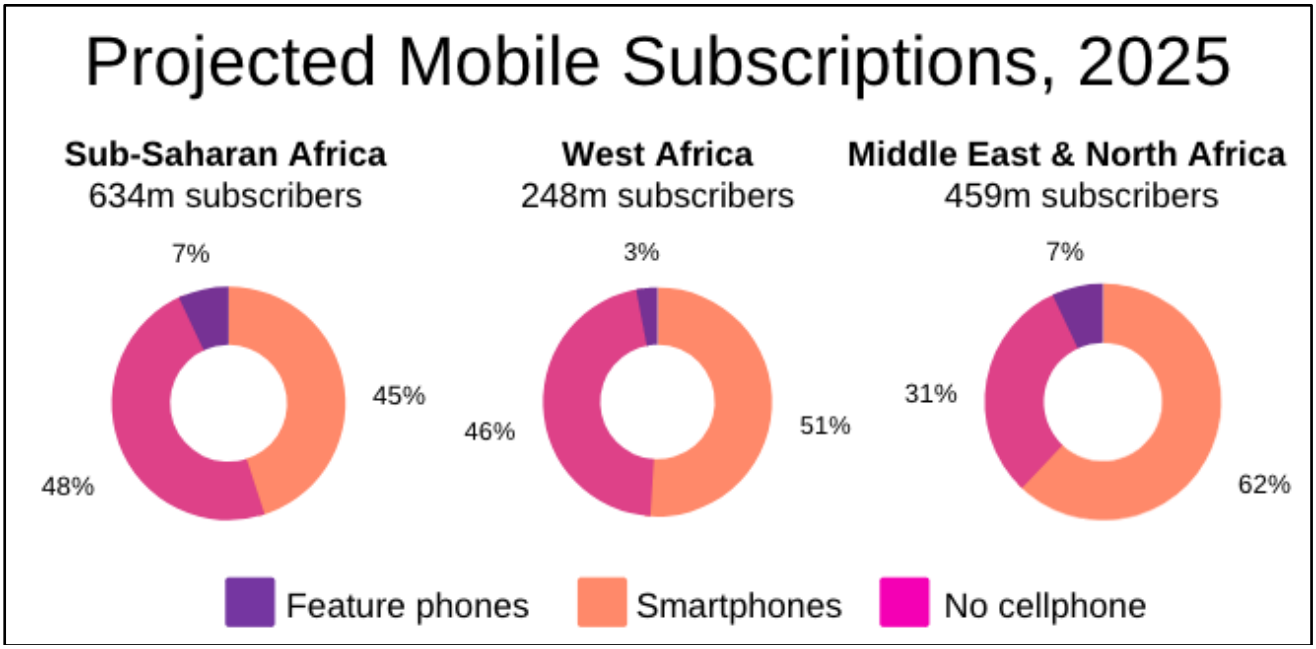


Figure 4. Data source: GSMA, "The Mobile Economy 2019."

To achieve higher rates of internet use, there also needs to be an increase in digital literacy education; in many regions, there is pervasive internet access, but relatively little internet use. In the ITU's 2018 report on wireless technologies in Africa, Akinwale Goodluck, the head of Sub-Saharan Africa GSMA, noted that in some regions, people refuse or are unable to connect due to issues of affordability, content, digital literacy or consumer awareness.[48] Therefore, as governments encourage more participation with technology in their marketplaces, they should also address broader socioeconomic barriers -- such as education level and gender equality -- that can hinder their progress in digital infrastructure.[49] The use cases outlined below will only be useful if users are taught the skills to be able to interact with the programs. More educational support in these areas will lead to better digital participation, which will enable the wider population to benefit from internet-based trade technology.

[48] ITU, "Report 2018: Wireless technologies for Africa" (2018).
[49] ITU, *supra* note 45.

2. Use Cases: Technology to Enhance Trade

Taking into account Africa's growing number of multilateral and bilateral trade agreements and developing digital infrastructure, technology designed to decrease knowledge-barriers to trade must be simple and user-friendly. Our objective for this project is to find examples of technology that can make comprehensive agreements more accessible for all users.

To meet this objective, this section will assess various use cases that incorporate technology into different aspects of the trading process. Because groups of users interact with trade agreements for different purposes, we have separated the analysis into three distinct groups:

Traders need to understand the agreements for their own trading activities and to ensure that they benefit from the rules negotiated on their behalf. Border agencies must understand how to administer trade within the rules of current agreements. Finally, policymakers need to understand the previous commitments of trade agreements to better negotiate future agreements and to achieve outcomes in their countries' national interest.[50] The digital tools and the corresponding issues they address are outlined in the table below:

[50] Note: For the purposes of these use cases, it is assumed that border agencies and policymakers have greater access to internet services than traders.

Digital Tool Groups	**Suggested Digital Tools**	1. Identifies obligations under trade agreements	2. Increases transparency in trade facilitation	3. Increases efficiency in cross-border trade	4. Addresses lack of internet access or use
Traders	Canada Tariff Finder	✓	✗	✓	possible
	Rules of Origin Facilitator	✓	✗	✓	possible
	M-Pesa	transferable	✗	transferable	✓
	Smart Contracts	✓	✓	✓	✗
	BitPesa	✗	✗	✓	possible
Border Agencies	ASYCUDA	✓	✓	✓	✗
	Smart Contracts	✓	✓	✓	✗
	Xalgorithms: Trade Policy 3.0	✓	✓	✓	✗
Policy-makers	Mapping BITs Project	✓	✗	✗	✗
	Tax Preparation Software	transferable	✗	transferable	✗
	Cognitive Trade Advisor	✓	✗	✓	✗

2.1 Technology for Traders

This section will focus on technology that can be used to assist traders on the ground. The programs identified were drawn on from existing practices both in Africa and other parts of the world, and can help traders to understand their rights and obligations within trade agreements. By having a better understanding of their rights and obligations under trade agreements, traders will be able to derive more benefit from them.

Presently, traders in the African context will benefit most from systems that use existing cell phone technology. As outlined above, mobile and broadband internet is increasing in Africa but dedicated internet coverage is variable.[51] Technology that uses a SMS- or USSD-based program would be an excellent example of using existing technology to disintermediate trade agreements, provided an applicable interface has been designed.

Looking forward, improved internet access will increase interaction with web-based trading interfaces. Benefits from distributed ledgers (i.e. blockchain) will require significant investment in internet capacity and coordination between regulatory and legal areas, but it would also produce significant results.

The programs that could be useful for traders are as follows:

1. Online search engines (examples: Canada Tariff Finder and Rules of Origin Facilitator);
2. USSD Technology (example: M-PESA); and
3. Blockchain (examples: smart contracts, micro-financing in Kenya, and BitPESA).

[51] GSMA, *supra* note 37.

2.1.1 Search engine websites allow traders to access context-specific information

Search engines that have information about tariff rates, rules of origin, and other trade rules allow traders to quickly and efficiently interact with trade agreements. By using these tools, traders do not have to search through trade agreements to determine what rules apply to their specific products. Two examples of this type of program are (1) the Canada Tariff Finder, and (2) the Rules of Origin Facilitator.

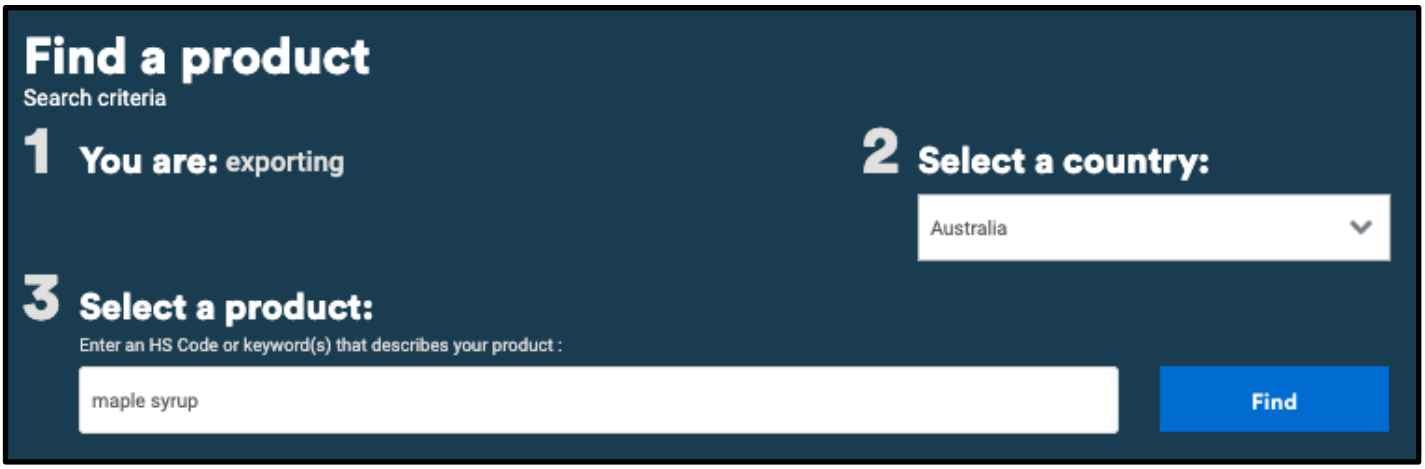
a) Canada Tariff Finder

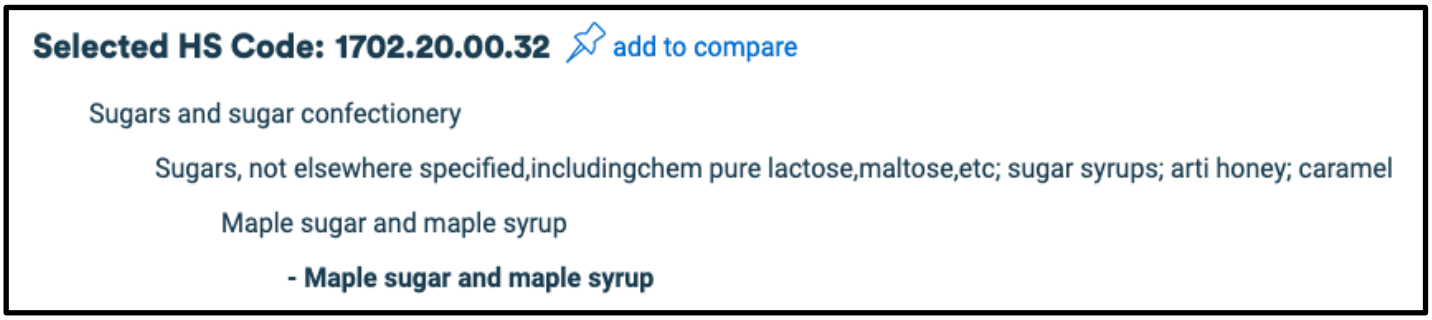
	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Canada Tariff Finder	✓ ➔ Users can quickly search through FTAs to display applicable tariffs on products	✗ ➔ Displays current tariffs, users will be aware of requirements ➔ Does not determine how goods will be treated at border	✓ ➔ More readily available information will help increase efficiency	**Possible** ➔ Requires internet connection ➔ Potential for USSD compati-bility
	Applicability to African Trade			
	Short term — Medium term — Long term ➔ Good example of an online tariff portal though limited to countries with an FTA with Canada ➔ Possible template for future websites that correspond to trade in Africa			

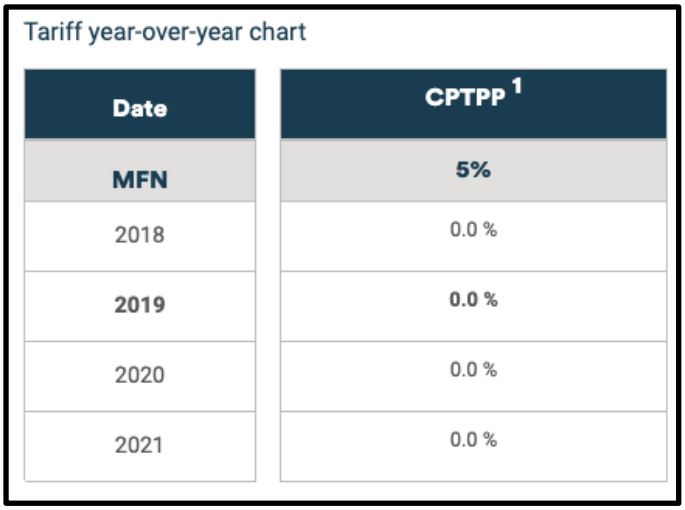
Canada Tariff Finder[52] is a free tool that traders and researchers can use to find tariffs applicable to specific goods. It is a joint project of the Business Development Bank of Canada (BDC),

[52] Address: <https://www.tariffinder.ca/>.

Export Development Canada (EDC) and the Canadian Trade Commissioner Service of Global Affairs Canada.[53] The target audience is countries with a free trade agreement (FTA) with Canada. The website uses tariff information provided by Canada's trading partners.







Figures 5,6,7. Process of tariff search. Source: Canada Trade Finder website.

To use the program, the user selects the country they want to export a product to, and enters the Harmonized Item Description and Coding System (HS) code to describe the relevant product. A keyword search can also be used to lookup the HS code. For example, when you search "maple" both "sugars and sugar confectionery" and "wood and articles of wood;

[53] Business Development Bank of Canada, "Canada Tariff Finder".

wood charcoal" are displayed. Further clarification of classification is done by clicking through the results. This way a user can determine the exact HS code that is required for the product. Tariff information is then displayed once the specific tariff line is selected. Users can print the results or receive them by email.

One limitation to the program is the lack of self-assessment; if there are follow-up questions or uncertainty, the tool instructs users to seek expert advice. A similar website by the Australian Government has a more sophisticated interface which prompts the user with dropdown menus.[54] There are links to contact respective government departments for questions but more information is readily available on the website. Having information online is beneficial, but reducing the need to contact someone for follow-up questions by providing a more thorough self-assessment mechanism would be preferred.

In the African context, this technology could serve as a good research tool that would allow users to identify obligations under specific trade agreements, compare tariffs across different countries, and identify different business opportunities. This website, however, requires a dedicated internet connection. A trader with an internet enabled smartphone could use the web interface, but as noted above, this technology would only be available in certain parts of Africa.

[54] The Free Trade Agreement Portal.

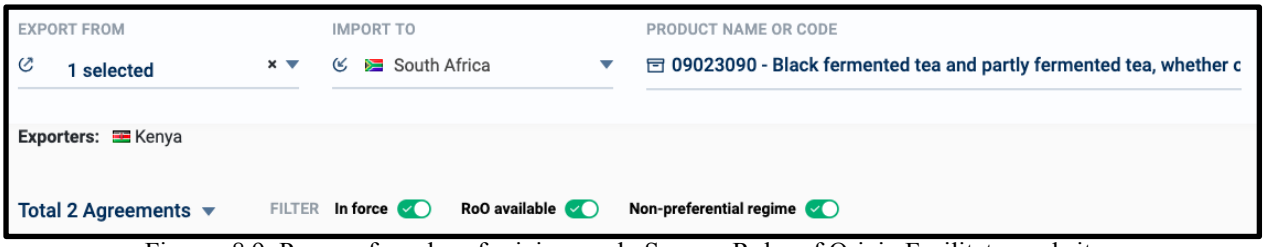
b) Rules of Origin Facilitator

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Rules of Origin Facilitator	✓ ➔ Tariffs, trade agreements, required documents and other information is displayed	✗ ➔ As with Canada Tariff Finder, traders will see the relevant information. ➔ Does not determine how border crossings will deal with product	✓ ➔ More readily available information will help increase efficiency	**Possible** ➔ Requires internet connection ➔ Potential for USSD compati-bility
	Applicability to African Trade			
	Short term Medium term Long term ➔ Excellent online repository for a wealth of trade agreement information ➔ Worldwide information, including many African countries			

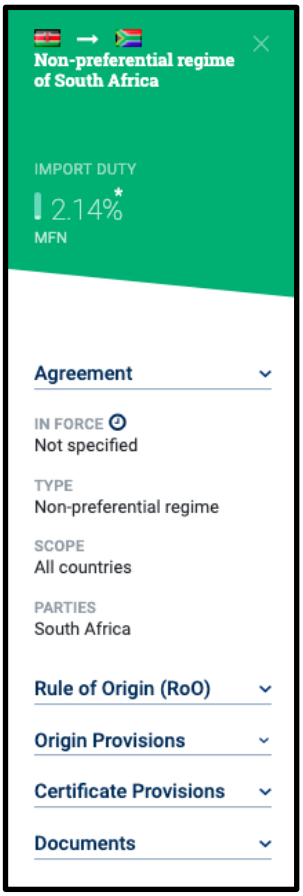
The rules of origin that apply across trade agreements vary widely.[55] This variation can make it difficult to determine the correct classification for a given product when exporting and lead to the misclassification of products. The Rules of Origin Facilitator[56] seeks to de-mystify rules of origin so that exporters and importers can properly classify their products. Unveiled by the International Trade Centre (ITC) and the World Customs Organization (WCO) in June 2018, this free web portal allows MSMEs and other users to search over 150 trade agreements applied to more than 190 countries. The ITC's database on rules of origin continues to expand and will

[55] World Trade Organization, "Technical Information on Rules of Origin".
[56] Address: <https://findrulesoforigin.org/home/index>.

eventually cover all preferential schemes and free trade agreements that are currently active in the world.[57] In addition, of all the programs surveyed in this project, the Rules of Origin Facilitator has the most user-friendly interface.[58]



Figures 8,9: Process for rules of origin search. Source: Rules of Origin Facilitator website.



The website has a simple search function, is free to all users, and is continually updated. The source of the trade agreement and tariff information comes from the website's Market Access Map,[59] developed by the ITC. The Market Access Map is free to users in developing countries and also contains trade remedies, rules and certificates of origin, non-tariff measures and trade flows. Through this function, ad-valorem equivalents for all non ad-valorem duties and simulated scenarios for tariff reduction can be determined.

The facilitator's easy-to-navigate interface frees the user from searching through thousands of pages of complicated legal texts to find applicable rules of origin; it is an important step to trade capacity building without expensive legal advice. The wealth of information on this site comes from data providers such as the ITC, UNCTAD, the WTO and national customs,

[57] International Trade Centre, "About the Rules of Origin Facilitator".
[58] For a demonstration, see video.
[59] International Trade Centre, "Market Access Map", (2015).

statistics and regional secretariats.[60] As with the Canadian Tariff Finder and the Australian Free Trade Agreement Portal, the Rules of Origin Facilitator helps to identify obligations under trade agreements for the user. A possible additional benefit is increasing efficiency in cross-border trade by reducing the possibility that products are mis-labelled or that documentation is insufficient.

Figure 10: HS code search. Source: rules of origin website.

To use the search engine, users simply select which country they are exporting from and where they are importing to, then enter either the product name or its HS code. There is a secondary lookup feature to determine the specific code for a given product. On the results page, users see the applicable trade agreement, rules of origin information and required documents among other vital trading information. It is important to note that exporters must classify

[60] International Trade Centre, "Market Access Map Data Providers" (2016).

products correctly in order to take advantage of any preferential tariff rates. Export licenses may be required and export duties might need to be paid.

MSMEs would likely benefit most from this program; however, it will also be useful for anyone interested in learning more about the rules of origin that apply in different countries. Reducing issues related to rules of origin is an excellent example of technology being used to disintermediate trade agreements: "[r]ules of origin have been identified as the most common source of constraints by MSMEs based on ITC business surveys."[61] Here, there are no required intermediaries, just the user and the applicable information.

As with other web interfaces, users will require some form of internet connection to access it, though it could possibly be developed into a USSD-based program. For future prospects, this could potentially be a starting point for codifying rules of origin agreements for machine processing.

2.1.2 USSD technology increases access to knowledge without requiring internet

Unlike simple send-and-receive SMS texts, USSD is an interactive service that creates a real-time connection.[62] Once the user submits a code, they receive a menu and interact with it by using their number pad to select options (see Figure 11 below). This connection remains open and allows a two-way exchange of a data sequence between the user and the USSD application platform. After the session has ended and the user has selected the action they wish to take (e.g. withdrawal of x number of dollars), the USSD application platform sends an SMS to the user. In

[61] International Trade Centre, "MSMEs to benefit from ITC-WCO Rules of Origin Facilitator" (28 June 2018).
[62] For further demonstration, see video.

essence, USSD technology is similar to an online drop-down menu platform, but it does not require an internet connection.[63]

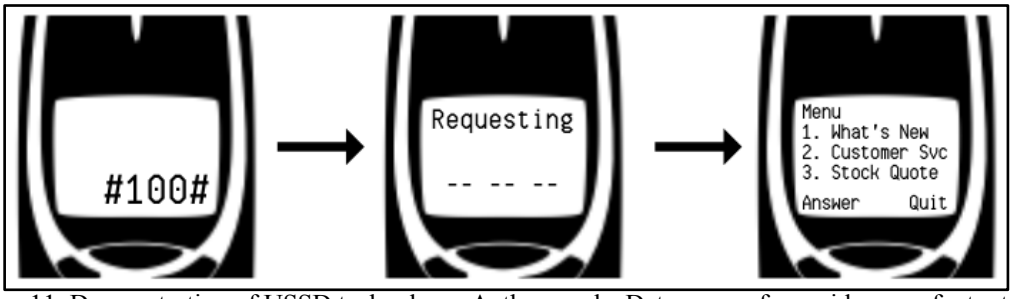


Figure 11. Demonstration of USSD technology. Author-made. Data source from video: see footnote 62.

USSD has been a popular technological platform worldwide for nearly a decade. GSMA estimates that one in five start-ups across Africa and Asia Pacific are leveraging USSD technology to accommodate their customer base.[64] One of the most prominent examples of this technology is M-Pesa, a project pioneered by Vodacom to introduce mobile banking to Africa.

a) M-Pesa

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
M-Pesa	**Transferable** ➔ USSD technology could display trade information	✗ ➔ While it does not directly decrease border officials' discretion, it could provide traders with more certainty before the border	**Transferable** ➔ USSD technology could be applied to trade	✓ ➔ Does not require data/internet ➔ All phones (feature and smart) are USSD/SMS-capable
	Applicability to African Trade			

[63] A Basigie et al, "Securing Mobile Money Services in Tanzania: A Case of Vodacom M-Pesa" (May 2014) 2:5 *International Journal of Computer Science & Network Solutions.*
[64] GSMA, "Start-ups and Mobile in Emerging Markets" (2017).

	Short term — Medium term — Long term ➔ USSD technology could be programmed for trade information-based program ➔ Feature phones already prevalent within African nations

M-Pesa is a mobile banking service that allows feature phone users to send and receive money through USSD and SMS technology. M-Pesa users are not subject to high banking fees and can save time and energy by transferring money remotely. The program first revolutionized banking systems in Kenya and began implementation in other countries in Africa after it's successful debut. The fact that M-Pesa uses USSD technology is a testament to Africa's unique infrastructure model and how people can innovate within their environmental parameters.

The USSD model used by M-Pesa is used for other business models and works well for information-based programs. For example, several mobile operators offer their users access to Facebook through USSD.[65] Users can input their username and passwords through their T9 keyboards (i.e. a keyboard that corresponds to the number pad on a feature phone), interact with menu options using numbers, and input statuses and messages up to 182 characters.

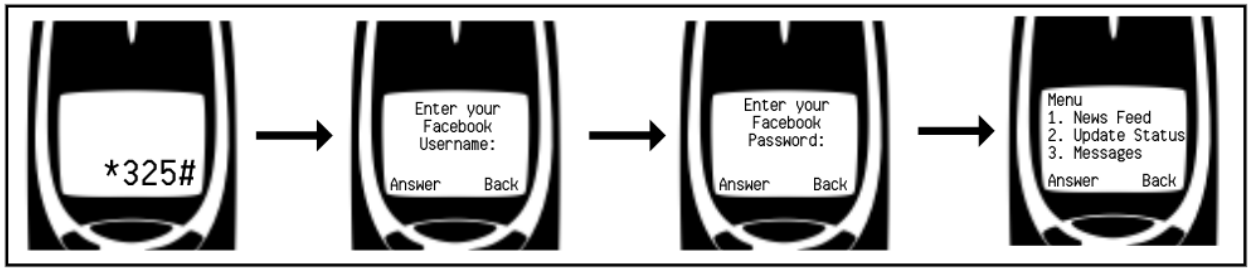


Figure 12. Data source: GSMA "Startups", footnote 64.

[65] GSMA, *Ibid*. See many other uses for USSD involving information sharing.

USSD is a good candidate for trade purposes because of its availability of menu-based options and word inputs. USSD technology could be used to create programs like Canada Tariff Finder or Rules of Origin Facilitator for traders without access to mobile data. Traders could choose their countries of import and export from a designated list, and input HS codes (or product descriptions if the specific HS code is unknown) using their phone's number pad.[66] Then, the trade agreement information requested, as it applies to their specific product, would be sent via SMS. See Figure 13 below for a potential linear USSD exchange.

#100# →	Input → Exporting Country:	Input → Importing Country:	Input → Product Description:	Choose → Product: 1. -- 2. -- 3. -- 4. --	Tariff Info Under [agrmnt]: 2018 - x% 2019 - x% 2020 - x%

Figure 13. Author-made mockup of a USSD-based tariff finder program.

Creating a tariff finder using USSD would likely be an easier program to produce than a Rules of Origin Facilitator. Tariffs are simpler than rules of origin and could be displayed on a small feature phone screen. Although it would be possible to create a USSD version of the Rules of Origin Facilitator, its multi-layered information output (including agreements, origin provisions, and certificate provisions) would be better suited for an online platform or mobile app. Similarly, a rules of origin self-assessment tool like Australia's[67] -- a potential and useful addition to the current Rules of Origin Facilitator -- would be better suited for a larger interface like a computer.

[66] Note: for more complicated or specific products, menus could be broken down into categories for better access and understanding.
[67] The Free Trade Agreement Portal.

2.1.3 Blockchain can expedite the entire trading process

Blockchain[68] is a popular technology for storing information in a decentralized manner. It is a digital record of transactions (a ledger) that is decentralized (no single entity controls the network) and distributed (records are shared with all participants). Blockchain networks can simplify documentation requirements, build trust, increase efficiency, and reduce fraud. This is because all transactions are posted online. There are many applications of blockchain being used in industries such as banking, shipping, and international trade.[69]

When a blockchain transaction occurs, a record is created and validated and then published onto the online network. The digital record of transactions grows continuously. As transactions occur, the list of records evolves and is combined in "blocks" that are "chained" to each other using cryptographic means, hence "blockchain".[70] With blockchain, there are no central authorities or intermediaries involved in the network. Only the members of the network can access the information. Each record has a unique cryptographic signature and a timestamp which means that the ledger is permanent and immutable. In addition, transaction information can be tracked and audited without the need of paper copies.[71]

Partnerships using blockchain exist between large enterprises such as banks, shipping companies, technology companies, and smaller-scale beneficiaries. Blockchain has the potential to be a transformative technology that will improve identity management, trust, and provide

---

[68] Note: a detailed assessment of Blockchain and its technical requirements is out of the scope of this project, but some basic characteristics will be discussed.
[69] Emmanuelle Ganne, "Can Blockchain Revolutionize International Trade?" (2018) World Trade Organization Publications at 111 [Ganne].
[70] *Ibid* at 1.
[71] *Ibid* at 26.

greater access to trade financing. Blockchains are particularly useful where security, trust between entities and data integrity are of the utmost importance.[72]

Blockchains can be public (not controlled by a specific entity), private (controlled by a single entity), or managed by a consortium of entities. Access can be open to everyone (permissionless) or restricted (permissioned) (see Figures 14 and 15 below).[73] Bitcoin is the most well-known example of a public and permissionless cryptocurrency which runs on blockchain, it is open to everyone. Most blockchains in international trade are consortium and permissioned.

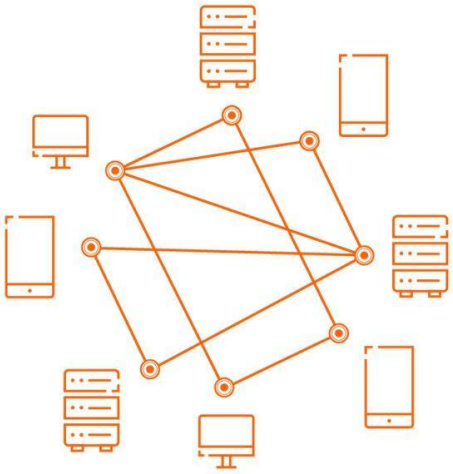


Figure 14. Permissionless Blockchain, where any user can access the network. Cryptocurrencies such as Bitcoin are typically permissionless.[74]

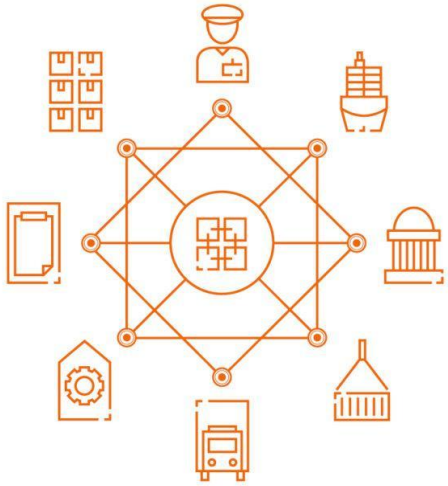


Figure 15. Permissioned Blockchain, here only authorized users can join the network.[75] Most Blockchains in international trade are permissioned and private or run by a consortium.

Blockchain can be a fundamental component of making international trade processes paperless. Customs clearance, trade finance, transportation, government inspections and other

[72] Gavin van der Nest, "Distributed Ledger Technology - opportunities for Africa's trade", *Tralac* Trade Brief (April 2018).
[73] Ganne, *supra* note 69 at viii.
[74] Ana Biazetti, "Setting Trade Free with Permissions" (12 February 2019), *Tradelens* (blog).
[75] *Ibid.*

aspects of international trade are extremely paper-intensive and involve a multitude of actors.[76] The process to move to paperless flow of goods across borders is complex. Technical requirements will have to be standardized; regulatory frameworks need to be developed with a common goal in mind,[77] and all aspects of cross-border trade will need to be digitized. This increases the amount of information available to traders at any time.

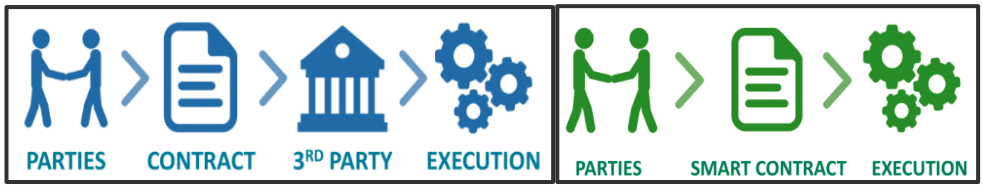
a) Smart Contracts

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Smart Contracts	✓ ➔ Obligations can be programmed directly into contract	✓ ➔ Transparency and identity management is built into Blockchain	✓ ➔ Great potential for reducing physical documentation and processing time	✗ ➔ Technologically intensive ➔ Dedicated access required
	Applicability to African Trade			
	Short term — Medium term — **Long term** ➔ Obligations can be programmed into contract, identity verification built in ➔ Implementation requires users to connect to internet and have strong bandwidth. For successful implementation, greater digital infrastructure is required			

An area with potential for growth is blockchain enabled "smart contracts". These are computer programs that self-execute when certain events or conditions are met. For example, if

[76] Ganne, *supra* note 69 at viii.
[77] Nadia Webster, "LabPlus: Better Rules for Government Discovery Report – key findings", (6 April 2018). Note: it is difficult to produce machine consumable rules if the policy and legislation has not been developed with common outputs in mind.

there is a shipment of goods received at port X then funds are transferred to account Y.[78] Additional conditions can be programmed into the contract to handle any possible event that could occur. Smart contracts can receive information as an input and process it according to the terms in the agreement and take specific action as a result. Smart contracts require an "oracle" which is a data feed that is provided by a third-party service provider because blockchains cannot access data outside their network. An oracle supplies any type of data such as market prices, temperature of a shipment or whether payment has been completed.[79]



Blockchain is technologically intensive, and dedicated internet access is required. Eventually it can involve many international trade actors, but at the present moment, MSME's and small business owners will benefit from programs run in conjunction with enterprise level organizations.[80] There are a multitude of blockchain implementations currently in use; there is no single "best" platform.[81]

Blockchain has the potential to help with identity management, reduce paper documentation requirements, and improve access to trade financing.[82] However, the technological requirements can be an issue. Current traders will likely have to partner with blockchain providers to benefit from the technology. To fully benefit from blockchain,

---

[78] Ganne, *supra* note 69 at 127.
[79] *Ibid* at 126.
[80] The Blockchain Association of Africa seek to incubate and promote African blockchain startups and build strategic relationships with international partners, among other goals.
[81] For example, Maersk and IBM have released the TradeLens platform for containerized shipping. It is comprised of over 100 enterprise shipping entities and is essentially the test case for Blockchain applied to maritime shipping. For further information, see TradeLens and Tradelens Ecosystem.
[82] *Ganne, supra* note 69 at 84-85.

significant work will be required to digitize records and design processes to be entirely online. Some blockchain applications are not viable for individual traders or MSMEs due to lack of resources. Absent a partnership with a blockchain provider, traders may have to wait until interfaces are more readily available.

Case Study
Twiga Foods and IBM blockchain-based micro-financing project in Kenya
The Twiga Foods and IBM Blockchain based micro-financing project was a trading platform that used mobile phone SMS and Blockchain technology to provide micro-loans to food vendors in Kenya in 2017.[83] The platform used machine-learning algorithms to predict the credit worthiness of thousands of users in an eight-week pilot project. This information was then used by lenders to provide microloans to many small businesses. After the credit score was determined, a blockchain network was used to apply, send out offers, and accept terms of loans. Small business often have issues accessing trade finance and these loans allowed them to sell more food and grow their businesses; by the project's end, over 220 loans were processed. This tool is an excellent example of a complicated technological process that is implemented through "low-tech" mobile SMS. Access to trade finance is a major issue for small business, it is time-consuming, paper intensive and involves many actors. Simplifying this process will have major benefits for these types of enterprises. This project should be viewed as a proof of concept in the African context for blockchain and mobile SMS working together. The project allowed a wide range of vendors to access crucial trade financing that would not otherwise be available to them.

[83] Andrew Kinai, "IBM and Twiga Foods Introduce Blockchain-Based Microfinancing for Food Kiosk Owners in Kenya", *IBM Research Blog* (18 April 2018) online: <https://www.ibm.com/blogs/research/2018/04/ibm-twiga-foods/>

b) BitPesa

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
BitPesa	✗ ➔ BitPesa is a currency transfer service ➔ Helps with trade and finance after trade agreements come into effect	✗ ➔ Payment platform not used at border crossings to date	✓ ➔ Much quicker access to funds ➔ Money transfer & trade financing with less processing time & cost	**possible** ➔ Users can access their bank accounts through SMS or USSD. If the bank can process BitPesa transfers then users can access funds on their phones.
	Short term — Medium term — **Long term** ➔ Removes intermediaries from money transfer to African countries served by BitPesa ➔ MSME's will benefit from quicker access to payments & financing ➔ Greater digital infrastructure is likely needed			

A McKinsey Quarterly report estimated that "2.5 billion of the world's adults don't use banks or microfinance to save or borrow money."[84] Conventional banking in the Global South is inefficient, expensive, and heavy on paper. BitPesa[85] was founded in 2013 in Kenya as a digital foreign exchange and payment platform. It uses blockchain to reduce cost and drastically increase the speed of payments to and from frontier markets.[86] When traders can access finance quicker, this increases efficiency in cross border trade.

[84] Alberto Chaia, Tony Goland, & Robert Schiff, "Counting the World's Unbanked", *McKinsey Quarterly* (March 2010).
[85] BitPesa Press Page.
[86] *Ibid.*

BFX (the product) by BitPesa (the brand) receives payment in local currency and in 2 to 48 hours, it sends it to the bank or receiver's mobile account using their local currency (see Figure 6 below). BitPesa has a presence in Nigeria, Uganda, Kenya, Tanzania, DRC, Senegal, Morocco and Ghana. Through links to European offices the BFX network can access over 50 worldwide markets. Nigeria is BitPesa's biggest market.[87]

As an example, a Nigerian company needs to pay a supplier in China. Using the BitPesa website or app, the company transfers money in local currency to BitPesa which buys bitcoin and sells it to a Chinese broker, this broker ensures the transfer goes into the recipient's bank account in local currency in China. Up to $10,000 US is transferred automatically and larger amounts have to be approved by BitPesa.[88] A big benefit to this system is the instantaneous remittance, which can reduce or nullify the need for intermediate letters of credit during conventional payment across borders.

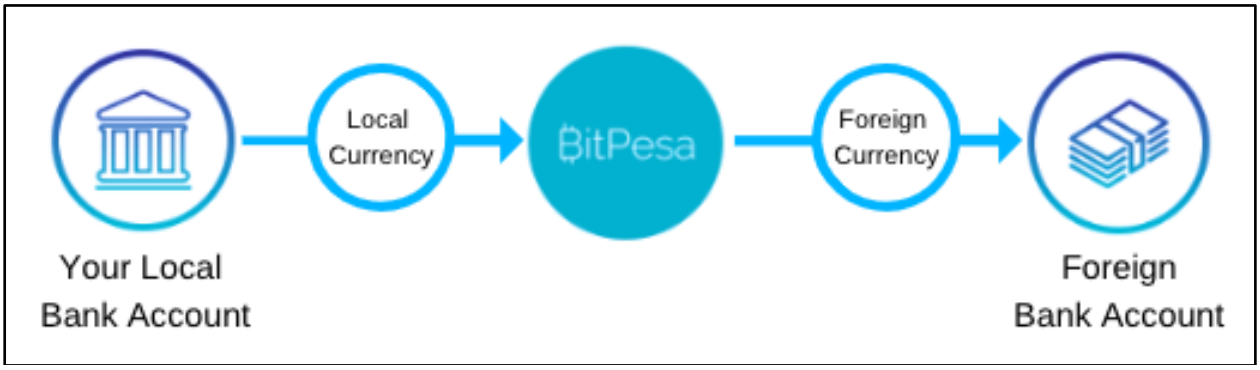


Figure 16. BitPesa's process. Source: BitPesa main page.

BitPesa helps MSMEs access new markets by simplifying and speeding up cross border payments. BitPesa removes the conventional requirement in some African markets of using US dollars during cross border currency exchanges; instead it uses bitcoin. BitPesa is essentially a

[87] BitPesa website - "Where we Work", online: <https://www.bitpesa.co/>

[88] Sanne Wass "Bitcoin – an Opportunity for African Trade?" (Global Trade Review, 20 July 2017).

bitcoin buyer and seller. Customers are protected from cryptocurrency price volatility due to the instantaneous transfer; whatever bitcoin's current exchange rate is what is charged to users of the service. BitPesa has lower fees and much quicker processing time than conventional money transfer services such as Western Union. Anyone who needs to send money to or from Africa will benefit from technology like BitPesa. Rapid remittance and cross-border payments are excellent ways to make trade more efficient.[89] However, as with some other technology mentioned in this report, BitPesa uses a secure website to process payments. Dedicated internet connections whether broadband or mobile are required.[90]

Case Study
BitPesa and SBI Remit, Improving Money Transfers to Africa
SBI Remit is a Japanese based money transfer company that has partnered with BitPesa to allow nearly half a million customers to send money to Africa using BitPesa's blockchain infrastructure.[91] Previously, when businesses and individuals wanted to do business between Japan and countries that BitPesa serve, they had to move Japanese Yen through several banks. The yen was often converted into intermediate currencies such as the Euro or US dollars. It would then be transferred to the recipient company's local currency, each one of these steps would add processing fees and time. According to Forbes, the World Bank has estimated that these fees can amount to 7% of the total amount moved and in Sub-Saharan Africa the fees can exceed 9.0%.[92] Bitpesa charges 3% on these transfers and supports the fiat currencies of Ghana, Kenya, Morocco, Nigeria, Senegal, Tanzania, Uganda, and the Democratic Republic of the Congo. All of these currencies are paired with the Japanese Yen and the transactions are executed instantly and guaranteed by BitPesa's blockchain capacity.[93] Reducing time and cost to send money to MSME's in Africa

[89] See "5 Ways BitPesa Makes Cross-Border Business Easier" (20 November 2018).
[90] BitPesa main page, online: <https://www.bitpesa.co/>
[91] Michael del Castillo, "Bitcoin Breakthrough? Japanese Giant Opens Corridor to Africa", Forbes (24 September 2018).
[92] *Ibid*, see also The World Bank - Press Release, "Record High Remittances to Low- and Middle-Income Countries in 2017" (23 April 2018).
[93] Nick Tsankanikas, "SBI Remit Partners with BitPesa to Boost Japanese Commerce in Africa" (27 September 2018) *Cryptocurrency News*.

will provide much needed financial resources for traders and businesses alike. Companies in the countries that BitPesa operates in will benefit greatly from this technology.

2.2 Technology for Border Agencies

While trade agreements are negotiated internationally, trade regulations are implemented and enforced on the national level; and, in order to implement trade regulations properly, border agencies need to understand and implement their general obligations under trade agreements. Complex inspection procedures and customs regulations can be significant barriers to the flow of goods -- especially those that are time sensitive. Delays, fees, and redundant practices (i.e. rekeying information to systems or submitting forms with same information on each page) are big impediments for all traders, but this is especially true of small firms. In fact, the time and resources spent on customs compliance are often a bigger impediment to trade than financial barriers such as tariffs.[94] And, because there are often many different governmental agencies involved in the process of international trade (customs, immigration, agriculture, etc.), it is important for countries to create organized and uniform processes so that traders can maintain certainty at the border.

To encourage better trade facilitation through technology, this section will outline two types of trade facilitation:

1. Customs automation programs (example: ASYCUDA); and

[94] WTO, "World Trade Report 2018".

2. Digitally automated agreements (examples: smart contracts and Xalgorithms' Trade Policy 3.0).

2.2.1 Automation programs eliminate redundant cross-border processes

Customs automation programs can help reduce non-transparent practices by digitally storing all relevant trade information. Automating customs processes reduces processing time, cost, and uncertainty at the border; it can result in increased transparency in the "assessment of duties and taxes, substantial reduction in customs clearance times, and predictability",[95] which all lead to direct and indirect savings for both government and traders. Automation programs have also co-existed with paper-based systems, in countries where technological infrastructure is not advanced enough to fully implement an electronic system.[96]

In addition, automation programs that allow for the submission of all customs-related documentation, known as "single window", are perhaps the most important recommendation by the WCO in the revised Kyoto Convention.[97] Single window formats create a online platform for the "exchange of information between customs authorities and other government agencies, as well as between the customs administrations of trade partners."[98] This platform streamlines time-consuming and redundant paperwork, and its transparent format reduces the opportunity for corrupt practices among customs officials. In essence, a single window format allows a majority

---

[95] Buyonge & Kireeva, *supra* note 13 at 47.
[96] Gerard McLinden et al, "Border Management Modernization" *Washington: The World Bank* (2011) at 128. In Mauritius, for example, the national single window is limited to customs declarations and the collection of duties, and does not permit users to submit customs documentation to other government agencies. See World Bank, "Trading Across Borders: Technology gains in trade facilitation" *Doing Business* 2017: Equal Opportunity for All (October 2016), at 80-81.
[97] Joann Peterson, "An Overview of Customs Reforms to Facilitate Trade" United States International Trade Commission, *Journal of International Commerce and Economics*, August 2017, at 5 [Peterson]. See also International Convention on the Simplification and Harmonization of Customs Procedures, 17 April 2008.
[98] *Ibid.* Single window formats could also incorporate programs to promote better compliance: consistent and compliant companies could be identified as "Trusted eTraders" and, as such, qualify for expedited entry. See UNCTAD, "Information Economy Report 2017 - Digitalization, Trade and Development" October 2017 at 86.

of the customs process to occur before physically reaching the border -- this improves wait times and leads to a more efficient process.

Automation programs would also assist governments that have made efforts with neighbouring countries to streamline customs processes regarding landlocked transportation, such as the Oikanse Border Post:

> [T]he Oikanse Border Post, located between Togo and Burkina Faso, is designed to process goods delivered through the Port of Lomé (Togo) and destined for neighboring Burkina Faso, Mali, and Niger. As a single entry point, the Oikanse Border Post streamlines clearance procedures that had been overseen by six separate government agencies on each side of the border, increasing customs efficiency and expediting the flow of goods to inland destinations.[99]

By using a computerized customs system (especially with an online format), all governments using the border post could have better access to their own customs data.

Further, the discrepancy between online platforms (which are the most useful automation systems) and a lack of internet use can likely be addressed by the Trade Facilitation Agreement Facility, established by the WTO in 2014.[100] The facility gives technical and financial assistance to developing countries when implementing provisions under the TFA. Through this assistance, it would be possible for developing countries to "simplify and automate customs paperwork, deploy risk-based assessment tools, such as cargo scanning devices, thereby reducing manual inspections,"[101] as well as increase technological education to promote better interaction with the automation programs.

---

[99] Barka, *supra* note 16 at 14.
[100] WTO, "Trade Facilitation Agreement Facility" (2015).
[101] Peterson, *supra* note 96 at 12. See also WTO, "Trade Facilitation Agreement Facility," 2015.

a) ASYCUDA

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
ASYCUDA	✓ ➔ Obligations programmed into software ➔ Nations can tailor it to implement own regulations	✓ ➔ Open format decreases risk of corruption at border ➔ Structured software creates uniformity for all agencies of one nation	✓ ➔ Online submissions reduce burden of submission forms	✗ ➔ Documents submitted on online platform ➔ Forms would not work well as USSD/SMS
	Applicability to African Trade			
	Short term — Medium term — Long term ➔ Already implemented in over 40 African countries ➔ Upgrade to ASYCUDAWorld (online single window platform) is available			

The most prominent customs automation system in Africa is the Automated System for Customs Data (ASYCUDA). It is a computerized system designed by UNCTAD and has been adopted by over 40 African countries (see Figure 17 below).[102] The system processes customs declarations, accounting procedures, and warehousing manifest and suspense procedures.[103] The latest version of the software, ASYCUDAWorld, uses open and web-based technology to increase accessibility for all parties involved in the trading process.[104]

[102] Buyonge & Kireeva, *supra* note 13.
[103] ASYCUDA website, online <https://asycuda.org/en/>.
[104] *Ibid.*

Figure 17. African countries that use ASYCUDA. Source: asycuda.org, 2019.

ASYCUDA has made a significant and lasting impact on international trade facilitation. After implementing the software, most countries report an increase in customs revenues, a better availability of reliable trade statistics and a reduction in average clearance time.[105] This is likely due to the fact that ASYCUDA was developed specifically for the administration of international trade agreements. The program accounts for all international codes and standards as established by International Organization for Standardization (ISO), World Customs Organization (WCO) and the United Nations.[106] Accordingly, the program reduces the need for a trade expert intermediary by linking trader obligations (ex. tariffs) in international trade agreements to a user-friendly customs platform.

In addition to maintaining international standards, countries can also configure ASYCUDA to suit their own national characteristics, such as "individual customs regimes,

[105] ASYCUDA website, *supra* note 102.
[106] *Ibid.*

national tariffs, customs regulations and legislation." After the initial configuration, the program can be adapted to change regulations as required. Thus, ASYCUDA allows customs agencies to use an internationally-based program to interact with trade agreements while also maintaining sovereignty around implementing domestic law.

Case Study

ASYCUDA Implementation Report: Commonwealth of Dominica

As part of the government's Growth and Social Protection Strategy, Dominica implemented ASYCUDA as their customs automation program first in 2004, and then again in 2008 with further technical and financial support. The World Bank and the EU financially contributed to its implementation.

Early issues with ASYCUDA were infrastructure-related: the bandwidth needed from service providers was too high, and intensive training was needed for customs staff, brokers, tariff clerks, shipping agents and traders regarding the computerized system. In addition, shifting from an inspection environment to a risk-based environment was a major change for border agencies.

Ultimately, Dominica observed "tremendous benefits" from the program, including:

- That transactions could be handled via the internet to which a majority of persons in Dominica had access 24 hours per day;
- Faster cargo clearance;
- Reduction in use of paper for customs transactions; and
- Reduction of the administrative burden on trade through the introduction of the Direct Trader Input (DTI).

The report also states that the government of Dominica found that establishing a "Customs & Excise Division" within the government was key to its implementation. The report was written during phase 3 of 4 of the program's implementation.

ASYCUDAWorld is an example of using the internet to improve existing trade software. Because it was redesigned to be web-based, ASYCUDAWorld offers more transparency and access to all parties throughout the customs and trade process. The new update makes the software a single window environment; in addition to allowing access to traders and customs officials, it incorporates other stakeholder institutions such as Port Authority and Ministries of

Trade, Agriculture, and Forestry. These institutions can also access trade information through the interface and perform their regulatory mandates within the system.[107]

Encouraging more countries to use automation programs like ASYCUDA will help to better facilitate cross-border trade. Some countries in Africa use similar automation programs (such as Senegal's ORBUS, seen below), but others could benefit from the direct implementation of ASYCUDA: in the African Development Bank Group's 2016 report regarding improvements to the transport sector, they specifically recommended implementing ASYCUDA's transit module in Somalia.[108] With these recommendations in mind, whichever automation program is chosen, governments should also couple this implementation with a promotion for more digital literacy programs. This paves the way for more complex versions of facilitation software to be understood and implemented.

Case Study
Senegal's Similar Automation Program: ORBUS
  Senegal's internet-based single window automation program, ORBUS, was introduced in 2004. Much like ASYCUDA, the program connects importers, exporters, and clearing agents with Senegal's customs administration, as well as banks, the treasury, and other public agencies.[109] In 2008, ORBUS's second phase was introduced, which also connected port authority and other transportation services firms.[110] The program allows users to make an initial request for customs clearance through a single online document, which replaces multiple paper documents that had be previously required at the border. Once the initial

[107] Commonwealth of Dominica, "Aid-for-Trade Case Story: ASYCUDAWorld Implementation Success Story" January 2011.
[108] African Development Bank Group, "Somalia: Transport Sector Needs Assessment and Investment Programme" (October 2016).
[109] Ibrahima Diagne, "Developing a single window to facilitate trade in Senegal" World Bank Group: Investment Climate in Practice (April 2010), at 3-4 [Diagne].
[110] United Nations Economic and Social Commission for Asia and the Pacific, "Towards a Single Single Window, Trading Environment: Senegal's Transition from a Paper-based System to a Paperless Trading System" Brief No. 5, January 2011.

request is made through ORBUS, the system generates and sends clearance documents to the various approving agencies.[111]

ORBUS is credited with increasing Senegal's customs revenues by 60% between 2005 and 2008, as well as with decreasing corruption within customs and improving the country's trade and investment environment.[112]

2.2.2 Smart contracts and computer-readable trade agreements could harmonize trade regulation internationally

While ASYCUDA World's internet-based software connects all parties within the trading system, using emerging technology like blockchain contracts and automated trade rules could better connect the trade agreements to the trade processes themselves. Through blockchain, traders and governments could have a version of all information regarding the trading process, and could add to the system from anywhere with an internet connection. This way, all relevant customs information would essentially be processed before the goods arrive at the border agency. This would significantly decrease customs processing delays, which would lower processing costs for traders. Because cumbersome customs practices (e.g. lengthy risk assessments, redundant paper forms, etc.) are especially harmful to MSMEs, having a decentralized, streamlined cross-border trading process would save time and money and foster the entry of small firms' -- who might otherwise only sell their products domestically -- into the export market.[113]

[111] Diagne, *supra* note 108 at 3-4.
[112] *Ibid*.
[113] World Trade Report, *supra* note 93.

Although this technology may seem ambitious in a technology landscape consisting predominantly of feature phones, blockchain and computer-based trade agreements may be closer than anticipated. Many regions within Africa's cell phone industry have been seeing the results of "leapfrogging": whereby communities bypass incremental technology (e.g. landlines) and invest in more modern technology (e.g. cell phones). By leapfrogging communication technology, Africa has largely been able to catch up with other continents in mobile phone usage. If leapfrogging produced expedited advancements within mobile subscriptions, it could occur with other types of technology as well.

a) Blockchain (smart contracts)

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Smart Contracts	✓ ➔ Trade obligations can be incorporated into contracts	✓ ➔ Blockchain format allows all parties to access same information ➔ This ensures greater certainty for trader before border	✓ ➔ Preclearance processes are essentially finished before reaching border	✗ ➔ Technologically intensive ➔ Dedicated access required
	Applicability to African Trade			
	Short term — Medium term — **Long term** ➔ Requires dedicated internet use ➔ Would involve IP legislation and inter-agency cooperation			

Similar to helping traders above, blockchain-based smart contracts can help increase transparency by decentralizing and dispersing customs information. Under a blockchain system, when the contents of a shipment are verified, data (such as weight, tariff classification, shelf-life for perishable goods, required documentation and fees) is published to an online ledger; all parties involved in the trading process would have access to the same information. This way, traders can be assured of no unexpected fees upon arrival at the border. The reason for this assurance is that it would be difficult for a customs agency to claim that a fee or regulation had not been addressed when there is a shared online record of all steps taken in the process.

In addition, the use of smart contracts would allow countries to automate certain processes, such as the payment of duties.[114] Because blockchain increases transparency and allows all parties to access the same information, it mitigates the risk of corruption or discretion within cross-border trade. Provided the smart contract has been programmed correctly, this interface can also assist with ensuring obligations under trade agreements are met.

Intellectual property (IP) is becoming an increasingly important part of international trade. Certain products that move across borders involve large investments in design, research and time to bring to market. Owners of these products need to protect their IP from unauthorized uses.[115] For example, a smart contract could be programmed to pay the rights-holders of copyrighted material when it is used. An online repository of creative works such as music or company branding could hold the contact details of the rights-holders and the applicable use of the product including licenses to use the work or branding on products that are sold on

---

[114] *Ibid*. Note for future TradeLab development: the report states that "various organizations such as the United Nations Centre for Trade Facilitation and Electronic Business, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the World Customs Organization are investigating the potential of the technology to facilitate cross-border trade, and several proofs of concept and pilot projects have been developed."
[115] Ganne, *supra* note 69 at 57.

consignment.[116] A more efficient payment system could be built into a smart contract which would reduce the requirement of an intermediary organization that handles payments to copyright holders.

There are interesting features of blockchain that could be applied to IP. From verifying the identity of the owners of copyrighted material, tracking the distribution of their material to combat piracy and counterfeiting, providing a time-stamped cryptographic record of a first use of a trademark, and an immutable record of a patent description to begin the patent registration process, these could all be made more efficient by using blockchain technology.[117]

b) Xalgorithms: Trade Policy 3.0

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Trade Policy 3.0	✓ ➔ Trade obligations programmed and incorporated into national regulations	✓ ➔ Automated regulation would decrease discretion at border ➔ Traders could ensure certainty of treatment	✓ ➔ Rules automation would decrease delays	✗ ➔ Trade regulations would be intended to be computer-readable
	Applicability to African Trade			
	Short term — Medium term — **Long term**			

[116] Ganne, *supra* note 69 at 62.

[117] An investigation of applying blockchain to IP issues could be a possible future TradeLab project. For a good overview of this area see Ganne, *ibid* at 57-67, and Birgit Clark, "Blockchain and IP Law: A Match made in Crypto Heaven?", *WIPO Magazine* (February 2018).

	➔ Requires overhaul to trade regulation legislation ➔ Would require thorough testing phase for automated "rulification" of trade regulations

As the world becomes more digitally literate, technology's role in international trade will expand beyond customs automation. Trade agreements and regulations could be written algorithmically, to enable machine-to-machine interaction. Craig Atkinson, a research fellow with the World Trade Institute, labelled this transition toward computer-readable text as "Trade Policy 3.0":[118]

> The distinctive character of trade policy 3.0 is that, in addition to "writing down the rules" of trade in natural language (trade policy 1.0) and use of "single window systems" that replicate paper-based delivery in the digital realm (trade policy 2.0), countries are able to publish computational rules to the internet in a standard way.[119]

"Trade Policy 3.0" can improve upon vague standards by "alleviating the uncertainty and informing citizens how to comply with objectively stated laws."[120] By creating digital versions of rules, businesses can have access to a universal mechanism for "determining calculations and automating payments in domestic and cross-border contexts." Therefore, much like "customs automation" as discussed above, this system would facilitate trade through "rules automation", which is a more efficient and transparent way to interact with trade agreements themselves.

The New Zealand government released a report in 2018 outlining the possibilities of implementing computer-readable legislation. The report provides a useful example of a provision regarding subsidy eligibility, to illustrate the ways in which software code could replace natural language within statutes:[121]

---

[118] Craig Atkinson, "Disruptive trade technologies will usher in the 'internet of rules'", *LSE Business Review*, April 2018.
[119] Atkinson, *Ibid.*
[120] Benjamin Alarie et al, "Regulation by Machine" *University of Toronto UP* (December 1 2016) at 4.
[121] New Zealand Discovery Report, "Better Rules for Government" March 2018.

<table>
<tr><th colspan="3">Determining if a person is eligible for a rates subsidy</th></tr>
<tr><td>Legislation</td><td>Pseudocode
(bold text denotes defined terms)</td><td>Software code</td></tr>
<tr><td>A person is eligible for a retirement village subsidy if, on the relevant date, the person:
1. is a resident of a retirement village; and
2. has a residential unit in the retirement village that is not separately rated; and
3. contributes to the outgoings of the retirement village.</td><td>A person is eligible for a retirement village subsidy for a retirement village only if all of the following are true:
● The person is a resident of the retirement village.
● The person has a residential unit in the retirement village that is not separately rated.
● The person contributes to the outgoings of the retirement village.</td><td><pre>has_residential_unit = False
if is_retirement_vilage_resident
and has_residential_unit
and contributes_to_outgoings_of_retirement_village:
 is_eligible = True
 is_retirement_subsidy = True</pre></td></tr>
</table>

Figure 18. Example of law as code. Source: New Zealand Discovery Report. See footnote 120.

Under the current framework, the user (e.g. trader) has to read the provision to see if they are eligible and then make their own assessment. Through software code, however, the user would input their own characteristics and the computer would analyze their compatibility with the legal requirements stipulated by the measures. Using software code therefore allows the user to interact with the policy using what they already know -- their own situational information.

For Trade Policy 3.0 to be successful, governments must ensure that the legislative provisions are comprehensive. In software code, there is no possibility of computers having discretion; they operate solely on instructions from the code. This means that all relevant possibilities stemming from the legislation need to be considered and implemented within the

algorithm itself.[122] Therefore, in the first phase of the development process, legislators will need to "rulify" their standards.[123]

Rulification would be easier to administer when the goods that are being processed fit within a recognizable category (i.e. HS code). This is because rules are constraining and rigid in nature. They do not leave room for adjudicative discretion. Once a rule is applied to a set of facts, the computer will immediately decide the outcome based on the number of options that the rule has previously decided.[124] Standards, on the other hand, may guide decisions but provide a large amount of discretion. This puts more authority in the decision-maker's hands, as it becomes a case-by-case analysis.

While "rulifying" standards would create more efficient trade agreements, some areas of international trade regulation are better suited for human discretion. For example, implementing a comprehensive rulified system could be difficult because of situations regarding qualified data, such as physical characteristics, functional likeness and consumer tastes and habits within the like products analysis.[125]

As many countries in Africa are still developing the infrastructure for internet access and high-speed bandwidth and promoting online participation (i.e. only 26% of the continent is online), "Trade Policy 3.0" is a future goal and therefore not a recommendation for immediate implementation. However, it is still important to keep this type of technology in mind when developing incremental programs that assist with trade disintermediation; it will assist program

---

[122] Dag Wiese Schartum, "Law and Algorithms in the Public Domain", Nordic Journal of Applied Ethics, 2016.
[123] Note: hybrids of rules and standards can also apply. See Alarie, *supra* note 118: "The lawmaker can set a broad objective, which might look like a standard. But the predictive technology will take the standard and engineer a vast catalog of context-specific rules for every scenario."
[124] Lawrence Solum, "Legal Theory Lexicon: Rules, Standards, and Principles", (6 September 2009), *Legal Theory* (blog).
[125] Appellate Body Report, *European Communities – Measures Affecting Asbestos and Products Containing Asbestos*, WT/DS135/AB/R (5 April 2001).

developers to differentiate between how technology can help to interpret trade agreements today, and how technology could more directly affect how agreements are expressed in the future.

2.3 Technology for Policymakers

The negotiation of trade agreements is a difficult process that can be highly time consuming because it requires policymakers to work with, research, and distill increasingly large amounts of complex text.[126] To further put this challenge in perspective, in the 1950s, an average trade agreement was approximately 5,000 words long. Today that number has increased to more than 50,000 words.[127] Accordingly, tools that enhance policymakers' ability to analyze complex text in preparation for, and during, trade negotiations could improve quality of work and decrease preparation costs.

This section will discuss two use cases that represent the type of technology that could be used by policymakers to enhance their preparation for, and participation in, trade negotiations:

1. Comparative analysis websites (example: Mapping BITs); and
2. Trade Agreement analysis via Artificial Intelligence (examples: tax administration software and the Cognitive Trade Advisor).

[126] DiploFoundation, "Mapping the challenges and opportunities of artificial intelligence for the conduct of diplomacy," (January 2019) at 26 [DiploFoundation].
[127] United Nations Conference on Trade and Development (UNCTAD), "Small economies welcome AI-enabled trade tool, but worries remain," (15 October 2018) [UNCTAD].

2.3.1 Comparative analysis tools can aid future negotiation

Tools that compare texts across various agreements are a good resource for policymakers because they enable them to better prepare for trade negotiations. Like some of the search engines outlined above, comparative analysis tools reduce the time that is required to navigate complicated agreements and help users quickly find the information they are seeking. The Mapping BITs project website is one example of such a tool.

a) Mapping Bilateral Investment Treaties Project

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Mapping BITs Project	✓ ➔ Allows users to compare textual similarity across trade agreements	✗ ➔ Does not directly affect transparency	✗ ➔ Does not directly affect efficiency in cross-border trade	✗ ➔ Requires internet access
	Applicability to African Trade			
	Short term — Medium term — Long term ➔ Low-cost, readily available technology ➔ Not universally user-friendly (in its current form), relies on knowledge and training of individual users to be most effective			

The Mapping BITs project provides policymakers, academics, and other interested parties with an online tool for comparing the text of bilateral investment treaties (BITs) (and, more recently, preferential trade agreements (PTAs)) from around the world. The project is led by Professors

Wolfgang Alschner and Dmitriy Skougarevskiy of the University of Ottawa and the European University at St. Petersburg, respectively.[128]

To measure the textual similarity between treaties, the developers of the Mapping BITs project used a *Jaccard* distance. The *Jaccard* distance represents the amount of overlap between two treaties. Identical treaties have a *Jaccard* score of 0, while completely different treaties have a *Jaccard* score of 1.[129] Notably, while the *Jaccard* score from one pair of treaties has limited informative value, the comparison of these scores across a large set of treaties has the potential to provide policymakers, academics, and other interested parties with valuable information about consistency and innovation in a specified country's trade agreement network.[130]

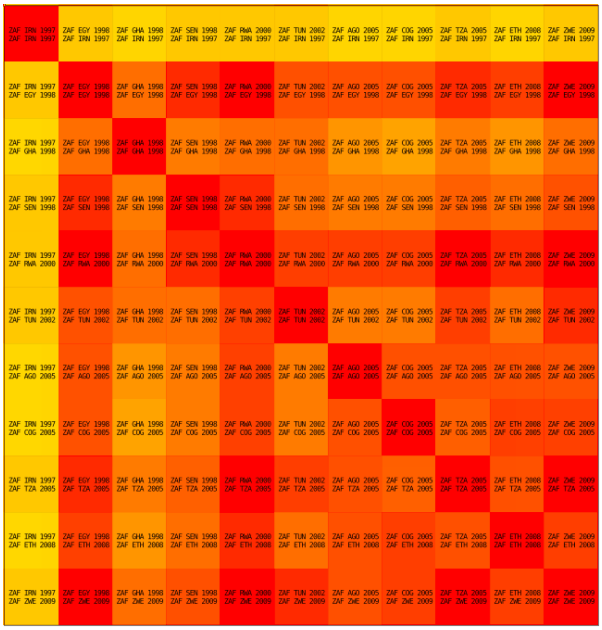


Figure 19. Visual representation of Mapping BITs website (comparing South Africa's trade agreements). Source: see footnote 128.

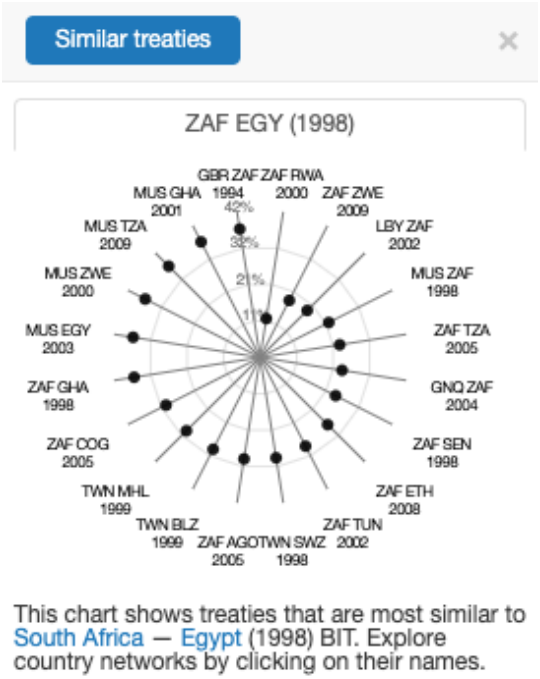


Figure 20. Visual representation of individual agreement comparison . Source: Mapping BITs website, see footnote 128.

[128] Wolfgang Alschner & Dmitriy Skougarevskiy, "Mappinginvestmenttreaties.com: Uncovering the secrets of the investment treaty universe" (16 May 2016).
[129] *Ibid.*
[130] *Ibid.*

The Mapping BITs website is the type of low-cost, readily available technology that could be used by policymakers who have been tasked with preparing for trade agreement negotiations with prospective or existing trading partners.

To give one concrete example of how the Mapping BITs website could be used in the context of intra-African trade, Alschner and Skougarevskiy used the tool to identify that Cameroon used "copy and paste" in its BIT practice because the country signed almost identical agreements with Guinea, Mali, and Mauritania during the Third UN Conference on the Least Developed Countries in 2001.[131] Put to practice, this type of knowledge could have been used to better inform and prepare the Moroccan policymakers that were involved in the negotiations leading to the Morocco-Cameroon BIT that was signed in 2007.[132]

In a related vein, these same policymakers could, in theory, use the Mapping BITs website to explore and compare trade agreements between other parties altogether and use this information to assist with drafting text that is consistent with the agreements reached by countries that face comparable challenges or have similar characteristics.

Regarding limitations, the Mapping BITs website is not particularly user-friendly (in its current form), and, although it contains a wealth of information, relies on the pre-existing knowledge and training of individual users to be most effective. Accordingly, while the website is a good tool for policymakers and should be used until more advanced technology becomes viable, it will require further development to be useful for policymakers going forward. One possible approach could be collaboration between the Mapping BITs project and AI, to improve the Mapping BITs website's accessibility and decrease reliance on users' expertise.

---

[131] *Ibid.*

[132] Investment Policy Hub, "International Investment Agreements Navigator".

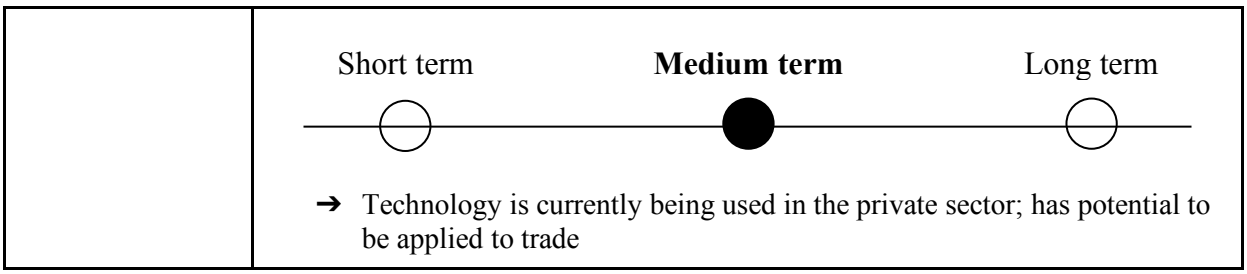
2.3.2 Artificial Intelligence can improve engagement with trade agreements

Artificial Intelligence (AI) is the programming or training of a computer to do tasks that in the past would have been reserved for human intelligence.[133] This technology can, and in some cases already does, enable lawyers and other professionals to focus their time and expertise on work that requires human judgement and to, by extension, serve their clients more effectively and at a lower cost.[134] Some examples of tasks that AI can be used for include the following: answering questions, filling out and searching documents, routing requests, translation, and drafting documents.[135]

a) Artificial Intelligence for Tax Administration

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Artificial Intelligence for Tax Administration	**Transferable** ➔ Used to navigate a complicated domestic legal system ➔ Current use includes assisting tax experts in detecting errors and classifying transactions	**✗** ➔ Does not directly affect transparency	**Transferable** ➔ Help users to more effectively engage with a complicated domestic legal system than would be possible without expertise	**✗** ➔ Requires internet access
	Applicability to African Trade			

[133] Hila Mehr, "Artificial Intelligence for Citizens Services and Government," (2017) *Harvard Kennedy School: Ash Center for Democracy Governance and Innovation* at 3 [Mehr].
[134] Michael Mills, "Using AI in Law Practice: It's Practical Now," (2016) *Law Practice* 48 at 48.
[135] Mehr, *supra* note 131 at 6.



Tax systems are often very complex. To give one concrete example, in the United States, the Internal Revenue Service (IRS) regulations are over 75,000 pages long. As a result, those who work in the field rely on training and expertise to understand the nuance, subtlety, and grey areas in the regulations, administrative rulings, and court cases to make judgments.[136] To improve how this work is done, tax authorities and tax advisors have begun to explore how to use data analytics and AI to facilitate compliance and assist professionals and their clients.[137]

This is not the first time that technology has been used to improve how users engage with tax systems. The introduction of tax preparation software first revolutionized how tax returns were prepared and filed beginning in the early 1990s. By 2003, 97% of returns filed by paid preparers in the United States were prepared by software. Similarly, for those who self-prepare, continued growth in the sector (e.g. sales of TurboTax in February 2016 were up 9% versus in 2015) indicates that the software continues to grow in popularity.[138]

Building on this earlier success and in response to continuing challenges, many AI tax applications have begun to emerge from both academic research and private firms that can, among other things, assist tax experts in detecting errors, classify transactions, and propose tax

[136] Cas Milner and Bjarne Berg, "Tax Analytics: Artificial Intelligence and Machine Learning - Level 5," (2017) PwC Advanced Tax Analytics & Innovation at 8.
[137] Deloitte, "Artificial Intelligence - Entering the World of Tax".
[138] Samara Gunter, "Your biggest refund, guaranteed? Internet access, tax filing method, and reported tax liability," (2018) *International Tax and Public Finance* at 7.

strategies.[139] The use of this technology in the private sector to navigate a complicated domestic legal system demonstrates the potential that exists for AI to be used for trade negotiations.

Case Study
H&R Block with Watson
A prominent example of AI being used for the purpose of tax administration is IBM Watson and its partnership with H&R Block, a tax services provider. The partnership, announced in 2017, was tested in approximately 100 H&R Block offices in January 2018, and then was set to be used the following filing season by 70,000 tax professionals at 10,000 branch offices across the United States.[140] To train Watson to understand context, interpret intent and draw connections between clients' statements and relevant areas of their tax return, H&R Block tax professionals approved when Watson suggested a smart question for a particular tax filer and corrected it when it did not.[141] Once trained, Watson was then able to help tax professionals by suggesting areas to explore with clients where they may qualify for deductions.[142] While this case study does not relate directly to trade, as noted in the table above and will be discussed below, there is significant potential for application in this area.

[139] Cas Milner and Bjarne Berg, "Tax Analytics: Artificial Intelligence and Machine Learning - Level 5," (2017) *PwC Advanced Tax Analytics & Innovation* at 1.
[140] Steve Lohr, "IBM Gives Watson a New Challenge: Your Tax Return," (1 February 2017) *The New York Times*.
[141] *Ibid.*
[142] DeAnn Gould-Lancaster, "AI for Enterprise: How Tax Pros are Transforming the Customer Experience with Watson" (2017).

b) The Cognitive Trade Advisor

	Identifies obligations under trade agreements	Increases transparency in trade facilitation	Increases efficiency in cross-border trade	Addresses lack of internet access or use
Cognitive Trade Advisor	✓ ➔ Reads, scans, classifies, and interprets provisions in trade agreements ➔ Designed to help trade negotiators by extracting and classifying the rules and then correlating them with products	✗ ➔ Does not directly affect transparency	✓ ➔ Intended for use in trade negotiations, but could have application for other users that increases efficiency (e.g. being trained to route requests)	✗ ➔ Requires internet access
	Applicability to African Trade			
	Short term **Medium term** Long term  ➔ Current version of the Cognitive Trade Advisor is a first step and further refinements will be required ➔ Prototype was used to assist with negotiations in the area of Rules of Origin			

The Cognitive Trade Advisor is an AI-powered tool that can read, scan, classify, and interpret thousands of provisions in trade agreements and related documents in less than a second. Developed by the International Chamber of Commerce (ICC) and the United Nations Conference on Trade and Development (UNCTAD), in partnership with IBM and as part of the Intelligent Tech and Trade Initiative (ITTI), the objective of the Cognitive Trade Advisor is to reduce the

amount of time that policymakers dedicate to trade negotiations and improve the quality of preparatory work.[143]

The below diagram illustrates how the Cognitive Trade Advisor functions. Using the example of negotiations involving rules of origin, the tool would help trade negotiators by extracting and classifying the rules and then correlating them with products. It would also present users with a chart to help them understand the profiles and interests of negotiating parties and includes a cognitive assistant named "Adam", who understands human language and can answer specific questions.[144]

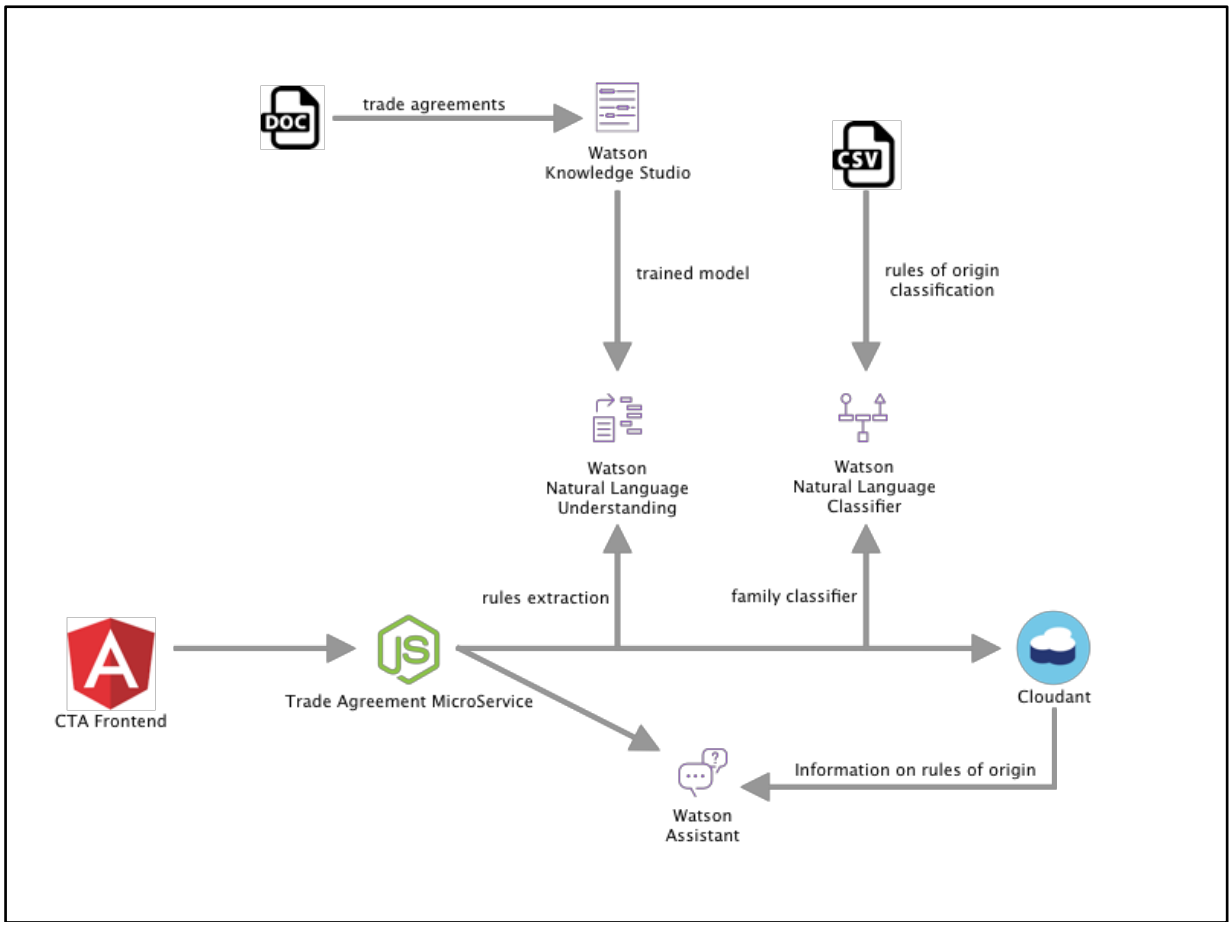


Figure 21. Visual representation of Cognitive Trade Advisor process. Source: IBM Cloud Blog, footnote 144.

[143] International Chamber of Commerce, "ICC launches Artificial Intelligence tool for Trade Negotiations," (2 October 2018) *CISION PR Newswire*.
[144] Maximiliano Ribeiro Aquino Santos, "Cognitive Trading using Watson," IBM Cloud Blog (12 December 2018).

The Cognitive Trade Advisor has the potential to improve the ability of policymakers to engage in trade negotiations both on the African continent and beyond. While the ICC has acknowledged that the current version of the Cognitive Trade Advisor is a first step and that further refinements will be required in collaboration with UNCTAD and other parties, the tool, once fully developed, is attractive because its use will not be limited to those with expertise in trade negotiations.[145]

Case Study

Canada-Mercosur Trade Negotiations

The first round of formal negotiations between Canada and Mercosur – a trading bloc comprised of Argentina, Brazil, Paraguay and Uruguay – took place in Ottawa from March 20 to 23, 2018.[146] As part of these negotiations, a prototype of the Cognitive Trade Advisor was used to assist with negotiations in the area of rules of origin define where a product originates from and then grant certain products preferential treatment based on this origin. Trade negotiations related to rules of origin are typically very complex and require extensive preparation, in large part due to the number and length of relevant agreements.[147] Accordingly, the Cognitive Trade Advisor was identified as a tool that could serve to be of great assistance to trade negotiators in this area.

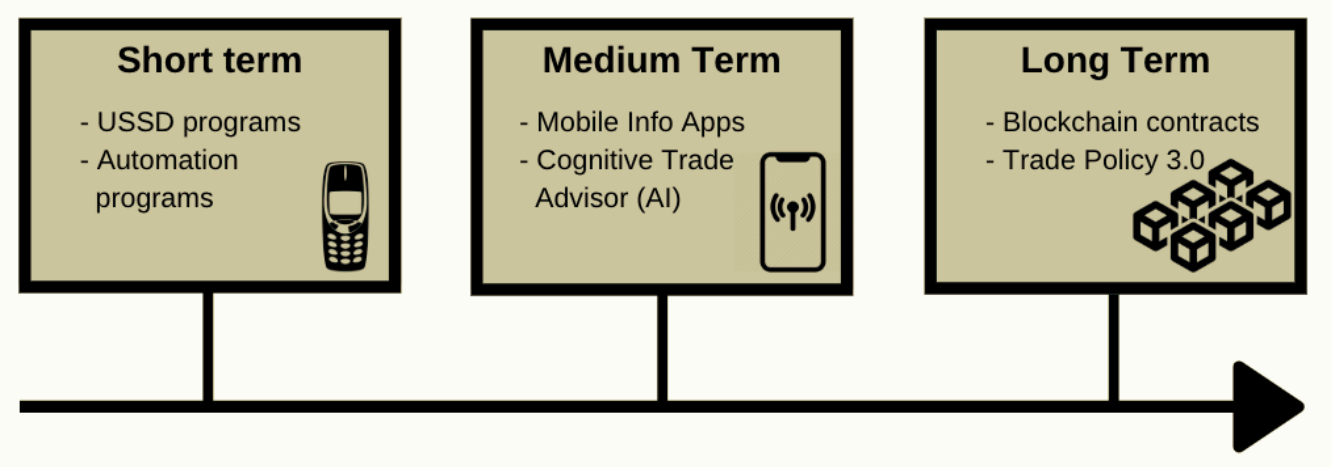
Once it was determined that the focus of the Cognitive Trade Advisor's first use would be rules of origin, the next step was training. For this purpose, two diplomats classified rules of origin a form understandable for the software and annotated trade agreements and relevant products to provide a basis from which the tool could learn to recognise rules of origin across all documents and correlate them with relevant products.[148] After this process was completed, the Cognitive Trade Advisor applied a combination of AI, data analytics and cloud computing resources, to comprehend and structure different families of rules of origin from previous trade agreements and then provide insights for negotiators.[149]

---

[145] UNCTAD, *supra* note 125.
[146] Global Affairs Canada, "Minister of International Trade welcomes first round of negotiations with Mercosur countries in Ottawa," (20 March 2018).
[147] DiploFoundation, *supra* note 124 at 26.
[148] *Ibid.*
[149] *Ibid.*

Once in use, the Cognitive Trade Advisor could help to "level the playing field" between negotiating partners with power imbalances and shorten the amount of time that policymakers require to prepare for negotiations, while improving the quality of preparatory work.[150] Theoretically, the Cognitive Trade Advisor could also be used to better analyze the economic impacts that agreements will have on different negotiating partners under different assumptions and to predict the trade responses from countries that are not party to the negotiations.[151]

3. Conclusion



The objective of this report is to identify technology that could, for reasonably low cost, have the greatest positive impact on African trade. To achieve this aim, this section will make recommendations on the technology that could be adopted to improve trade facilitation in Africa over the short, medium, and long term. In making these recommendations, consideration was given to such factors as the most common trade barriers in the African context, existing technological infrastructure, and the costs associated with implementing the selected technology.

---

[150] *Ibid.*

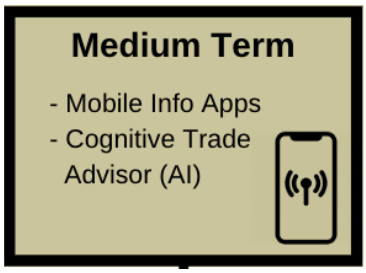
[151] Joshua Meltzer, "The Impact of Artificial Intelligence on International Trade," *Brookings Institution* (13 December 2018).

Disclaimer
Digital Tools: Costs of Implementation
In recommending digital tools, the authors of this report considered the cost of implementation of the digital tools. There are too many variables (e.g. country-specific data, technological infrastructure present, prevalence of data-capable mobile phones, etc.) to quantify costs in this scoping paper; however, the "short term" tools use existing technology and infrastructure, therefore accounting for minimal startup costs. Programs like ASYCUDA are also supplemented by funding for developing countries who wish to use the program (see WTO's Trade Facilitation Agreement Facility). With regard to "long term" tools, it is more difficult to make any assumptions about cost. The infrastructure for a digital tool such as smart contracts (blockchain) is not yet present, and would incorporate a number of variables including blockchain programmer wages and implementation of sufficient internet bandwidth. For this reason, it is recommended that this cost assessment be left for a future TradeLab project, where the assessment can be tool- and/or country-specific.

In the short term, existing technology that uses mobile SMS and USSD will have the greatest impact, especially in LDCs. Current cell phone coverage is extensive throughout many regions in Africa. Creating a USSD-based tariff finder is a good example of how current technology can assist traders on the ground.

In addition, encouraging more countries to use automated customs programs like ASYCUDA would improve trade facilitation in the short term without requiring a major investment for programming and the development of new technology. ASYCUDA's most recent update is especially beneficial, as it incorporates more internet connectivity and can further improve the integrity and efficiency of the customs process.

In the medium term, development of mobile apps is a good area to focus on. As GSMA predicts that approximately 90% of African cell phone subscribers will be using smartphones by 2025, this means that the required technology for users to access mobile apps will be widely available. Mobile applications are simpler to use and take much less time than conventional paper processing. If existing programs like the Rules of Origin Facilitator could be re-programmed into a mobile phone app, it would essentially allow traders to have a virtual customs broker in their pocket.



Another area that could warrant use in the medium term are online programs, like the Cognitive Trade Advisor, that give policymakers an enhanced ability to prepare for trade negotiations. While this technology already exists to some degree, our research suggests that it will require further refinement before it can be effective on a large-scale.

In the long term, when countries have greater access to high-speed internet and technological literacy is more pervasive, technology such as blockchain and "Trade Policy 3.0" could have transformative effects on trade in Africa. By decentralizing information and putting trade agreements into computer-readable format, it would give all users in the trading process -- traders, customs agencies, and policymakers -- more clarity about the rules for trade applicable to them. This final stage would require substantial investment in technology, but would revolutionize how users engage with trade rules in Africa and bring trade agreements into the 21st century.

Bibliography

INTERNATIONAL AGREEMENTS

Agreement Establishing the African Continental Free Trade Area, 21 March 2018 (not entered into force), online: <https://www.tralac.org/resources/our-resources/6730-continental-free-trade-area-cfta.html>.

International Convention on the Simplification and Harmonization of Customs Procedures, 18 May 1973 (entered into force as amended 3 February 2006), online: <http://www.wcoomd.org/Topics/Facilitation/Instrument%20and%20Tools/Conventions/pf_revised_kyoto_conv/Kyoto_New>.

Protocol Amending the Marrakesh Agreement Establishing the World Trade Organization, Agreement on Trade Facilitation, 28 November 2014, WT/L/940 (entered into force 22 February 2017), online: <https://www.wto.org/english/docs_e/legal_e/tfa-nov14_e.htm>.

JURISPRUDENCE

Appellate Body Report, *European Communities – Measures Affecting Asbestos and Products Containing Asbestos*, (5 April 2001), WTO Doc WT/DS135/AB/R (Appellate Body Report), online: WTO <docsonline.wto.org>.

SECONDARY MATERIAL: ARTICLES

Alarie, Benjamin, et al. "Regulation by Machine" *University of Toronto UP* (December 1 2016), online: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2878950>.

Alschner, Wolfgang & Dmitriy Skougarevskiy. "Mappinginvestmenttreaties.com: Uncovering the secrets of the investment treaty universe" (16 May 2016), online:

<https://www.iisd.org/itn/2016/05/16/mappinginvestmenttreaties-com-uncovering-the-secrets-of-the-investment-treaty-universe-wolfgang-alschner-dmitriy-skougarevskiy/>.

Atkinson, Craig. "Disruptive Trade Technologies will Usher in the 'Internet of Rules'" *LSE Business Review* (26 April 2018), online: <https://blogs.lse.ac.uk/businessreview/2018/04/26/disruptive-trade-technologies-will-usher-in-the-internet-of-rules/>.

Aquino Santos, Maximiliano Ribeiro. "Cognitive Trading using Watson" *IBM Blog* (12 December 2018), online: <https://www.ibm.com/blogs/bluemix/2018/12/cognitive-trading-using-watson/>.

Basigie, A et al."Securing Mobile Money Services in Tanzania: A Case of Vodacom M-Pesa" (May 2014) 2:5 *Intl J of Computer Science & Network Solutions*, online: <https://openknowledgemaps.org/search_api/server/paper_preview/2538c9cedf9541c49f9d6180700e9a6f.PDF>.

Barka, Habiba Ben. "Border Posts, Checkpoints, and Intra-African Trade: Challenges and Solutions" *African Development Bank* (January 2012), online: <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/INTRA%20AFRICAN%20TRADE_INTRA%20AFRICAN%20TRADE.pdf>.

Biazetti, Ana. "Setting Trade Free with Permissions" *Tradelens* (12 February 2019), online: <https://blog.tradelens.com/news/setting-trade-free-permissions/>.

Buyonge, Creck & Irina Kireeva. "Trade facilitation in Africa: Challenges and Possible Solutions" (2006) 2:1 *World Customs Journal*.

Castillo, Michael del. "Bitcoin Breakthrough? Japanese Giant Opens Corridor to Africa" (24 September 2018) *Forbes*, online:

<https://www.forbes.com/sites/michaeldelcastillo/2018/09/24/bitcoin-breakthrough-japanese-giant-opens-corridor-to-africa/#7b2bd4c87d3c>

Chaia, Alberto, Tony Goland & Robert Schiff. "Counting the World's Unbanked" (March 2010) *McKinsey Quarterly*, online: <https://www.mckinsey.com/industries/financial-services/our-insights/counting-the-worlds-unbanked>.

Chidede, Talkmore. "An Update on the WTO Trade Facilitation Agreement and African countries" *Tralac* (21 February 2019), online: <https://www.tralac.org/publications/article/13920-an-update-on-the-wto-trade-facilitation-agreement-and-african-countries.html>.

Clark, Birgit. "Blockchain and IP Law: A Match made in Crypto Heaven?" (February 2018), *WIPO Magazine*, online: <https://www.wipo.int/wipo_magazine/en/2018/01/article_0005.html>

Deloitte. "Artificial Intelligence - Entering the World of Tax" (2017), online: <https://www2.deloitte.com/global/en/pages/tax/articles/artificial-intelligence-in-tax.html>.

Diagne, Ibrahima. "Developing a single window to facilitate trade in Senegal" (April 2010) *World Bank Group: Investment Climate in Practice*, online: <http://documents.worldbank.org/curated/en/987651468103768990/pdf/598350Brief01p158300B0Senegalnote11.pdf>.

DiploFoundation. "Mapping the challenges and opportunities of artificial intelligence for the conduct of diplomacy" (January 2019), online: <https://www.diplomacy.edu/sites/default/files/AI-diplo-report.pdf>.

Djankov, Simeon et al. “Trading on Time” (June 2006) 92:10 *Review of Economics and Statistics*, online: <https://pdfs.semanticscholar.org/21cc/05272934cb1f89b1b3765e252db108c7a5c7.pdf>.

Erasmus, Gerhard. “What will happen to the Regional Economic Communities and other African Trade Arrangements once the AfCFTA is operational?” *Tralac* (11 June 2018), online: <https://www.tralac.org/publications/article/13135-what-will-happen-to-the-regionaleconomic-communities-and-other-african-trade-arrangements-once-the-afcfta-is-operational.html>.

Ganne, Emmanuelle. “Can Blockchain Revolutionize International Trade?” (2018) *World Trade Organization*, online: <https://www.wto.org/english/res_e/booksp_e/blockchainrev18_e.pdf>.

Gould-Lancaster, DeAnn. “AI for Enterprise: How Tax Pros are Transforming the Customer Experience with Watson” *IBM Blog* (2017), online: <https://www.ibm.com/blogs/watson/2017/02/watson-tax/>.

Gunter, Samara. “Your biggest refund, guaranteed? Internet access, tax filing method, and reported tax liability” (2018) *International Tax and Public Finance.*

GSMA. “The Mobile Economy 2019” (2019), online: <https://www.gsma.com/r/mobileeconomy/>

GMSA. “Mobile Technologies for the SDGs” (2019), online: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/05/Start-ups-using-USSD-to-tackle-SDGs.pdf>.

International Telecommunications Union. “ICT Facts and Figures 2017” (2017), online: <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf>

International Trade Centre. Press Release, "MSMEs to Benefit from ITC-WCO Rules of Origin Facilitator" (28 July 2018), online: <http://www.intracen.org/MSMEs-to-benefit-from-ITC-WCO-Rules-of-Origin-Facilitator/>.

Jalakasi, Wiza. "How a 20-year old Mobile Technology Protocol is Revolutionizing Africa (With Numbers)" *Medium* (16 May 2018), online: <https://medium.com/@wizaj/how-a-20-year-old-mobile-technology-protocol-is-revolutionising-africa-with-numbers-744a52cbea92>.

Kinai, Andrew. "IBM and Twiga Foods Introduce Blockchain-Based Microfinancing for Food Kiosk Owners in Kenya" *IBM Blog* (18 April 2018), online: <https://www.ibm.com/blogs/research/2018/04/ibm-twiga-foods>.

Li, Yue and John Wilson. "Time as a Determinant of Comparative Advantage" *World Bank Policy Research Working Paper* (1 November 2009), online: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1509195>.

Lohr, Steve. "IBM Gives Watson a New Challenge: Your Tax Return" *The New York Times* (1 February 2017), online: <https://www.nytimes.com/2017/02/01/technology/ibm-watson-tax-return.html>.

McLinden, Gerard et al. "Border Management Modernization" Washington: The World Bank (2011), online: <http://documents.worldbank.org/curated/en/986291468192549495/pdf/588450PUB0Bord101public10BOX353816B.pdf>.

Mehr, Hila. "Artificial Intelligence for Citizens Services and Government" (2017) *Harvard Kennedy School: Ash Center for Democracy Governance and Innovation.*

Meltzer, Joshua. "The Impact of Artificial Intelligence on International Trade" *Brookings Institution* (13 December 2018), online: <https://www.brookings.edu/research/the-impact-of-artificial-intelligence-on-international-trade/#footnote>.

Mills, Michael. "Using AI in Law Practice: It's Practical Now" (2016) *Law Practice* 48.

Milner, Cas and Bjarne Berg. "Tax Analytics: Artificial Intelligence and Machine Learning - Level 5" (2017) *PwC Advanced Tax Analytics & Innovation*.

Mourdoukoutas, Eleni. "Africa's digital rise hooked on innovation" (July 2017), online: <https://www.un.org/africarenewal/magazine/may-july-2017/africa%E2%80%99s-digital-rise-hooked-innovation>.

Organisation for Economic Co-operation and Development. Policy Brief, "The Costs and Benefits of Trade Facilitation" *Paris: OECD* (2005), online: <http://www.unece.org/fileadmin/DAM/trade/forums/forum02/presentations/session_ii/akleitz.pdf>.

Pauwelyn, Joost & Wolfgang Alschner, "Forget About the WTO: The Network of Relations between Preferential Trade Agreements (PTAs) and 'Double PTAs' (30 May 2014) *SSRN*, online: <https://ssrn.com/abstract=2391124 or http://dx.doi.org/10.2139/ssrn.2391124>.

Peterson, Joann. "An Overview of Customs Reforms to Facilitate Trade" *United States International Trade Commission: Journal of International Commerce and Economics* (August 2017), online: <https://www.usitc.gov/publications/332/journals/jice_customsreformstofacilitatetradepeterson_508_compliant.pdf>.

PWC. "Making Sense of Bitcoin, Cryptocurrency and Blockchain", (June 2018) online: <https://www.pwc.com/us/en/industries/financial-services/fintech/bitcoin-blockchain-cryptocurrency.html>.

Rosengard, Jay. "A Quantum Leap over High Hurdles to Financial Inclusion: The Mobile Banking Revolution in Kenya"(29 June 2016) *SWIFT Institute Working Paper No. 2015-005*, online: <https://www.swiftinstitute.org/wp-content/uploads/2016/06/SWIFT-Institute_Financial-Inclusion_FINAL-1.pdf>.

Saez, Catherine. "4 of 5 People in LDCs Can Access Mobile Networks, But Are Not Using Internet" *Intellectual Property Watch* (24 January 2018), online: <http://www.ip-watch.org/2018/01/24/itu-4-5-people-ldcs-can-access-mobile-networks-not-using-internet/>.

Schartum, Dag-Wiese. "Law and Algorithms in the Public Domain" (2016) 10:1 *Nordic J of Applied Ethics*, online: <https://www.ntnu.no/ojs/index.php/etikk_i_praksis/article/view/1973/1989>

Solum, Lawrence. "Legal Theory Lexicon: Rules, Standards, and Principles" *Legal Theory* (6 September 2009), online: <https://lsolum.typepad.com/legaltheory/2009/09/legal-theory-lexicon-rules-standards-and-principles.html>.

Sow, Mariama. "Figures of the week: Africa's intra-and extra-regional trade" *Brookings Institution* (29 March 2018), online: <https://www.brookings.edu/blog/africa-in-focus/2018/03/29/figures-of-the-week-africas-intra-and-extra-regional-trade/>.

Suchak, Ravi. "Roadmap to 5G in Africa", *ITU Telecom World* (28 August 2018), online: <https://telecomworld.itu.int/blog/roadmap-to-5g-in-africa/>.

Telecomworld. "Wireless Technologies for Africa" ITC Telecomworld (13 September 2018), online: <https://telecomworld.itu.int/2018-daily-highlights-day-3/wireless-technologies-for-africa/>.

Tralac. "WTO's Trade Facilitation Agreement enters into force" (22 February 2017), online: <https://www.tralac.org/news/article/11310-wto-s-trade-facilitation-agreement-enters-into-force.html>.

Tsankanikas, Nick. "SBI Remit Partners with BitPesa to Boost Japanese Commerce in Africa" (27 September 2018), Cryptocurrency News, online: <https://blokt.com/news/sbi-remit-partners-with-bitpesa-to-boost-japanese-commerce-in-africa>

Turnes, Paloma Bernal & Ricardo Ernst. " A Framework for Transparency in International Trade" (2015) 21:1 *Investigaciones Europeas de Direccion y Economia de la Empresa* (2015).

Valensis, Geovanni et al. "The Trade Facilitation Agreement and Africa's Regional Integration" (2016) 37:2 *Can J of Development Studies* 239.

Van der Nest, Gavin. "Distributed Ledger Technology - Opportunities for Africa's Trade" *Tralac Trade Brief* (April 2018), online: <https://www.tralac.org/publications/article/12938-distributed-ledger-technology-opportunities-for-africa-s-trade.html>.

Wass, Sanne. "Bitcoin- an Opportunity for African Trade?" *Global Trade Review* (20 July 2017), online: <https://www.gtreview.com/news/africa/bitcoin-an-opportunity-for-african-trade/>.

Webster, Nadia. "LabPlus: Better Rules for Government Discovery Report - Key Findings" (6 April 2018), online: <https://www.digital.govt.nz/blog/labplus-better-rules-for-government-discovery-report/>.

World Bank. "Trading Across Borders: Technology gains in trade facilitation" *Doing Business 2017: Equal Opportunity for All* (October 2016), online: <https://elibrary.worldbank.org/doi/10.1596/978-1-4648-0948-4_Case6>.

Yasui, Tadashi. "Benefits of the Revised Kyoto Convention" *WCO Research Paper* (February 2010), online: <http://www.wcoomd.org/~/media/wco/public/global/pdf/topics/research/research-paper-series/rkc_benefits.pdf?la=en>.

Zake, Justin. "Customs Administration Reform and Modernization in Anglophone Africa" IMF (August 2011), online: <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Customs-Administration-Reform-and-Modernization-in-anglophone-Africa-Early-1990-s-to-Mid-2010-25141>.

SECONDARY MATERIAL: OTHER

Aid-For-Trade Case Story, Commonwealth of Dominica, "Asycuda World Implementation Success Story (January 2011), online: <https://www.oecd.org/aidfortrade/48291246.pdf>.

African Development Bank Group. "Somalia: Transport Sector Needs Assessment and Investment Programme" (October 2016), online: <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Somalia_Transport_Sector_Needs_Assessment_and_Investment_Programme.pdf>.

African Union. "Regional Economic Communities", online: <https://au.int/en/organs/recs>.

ASYCUDA. Online: <https://asycuda.org/en/>.

BitPesa Press Page. Online: <https://www.bitpesa.co/press/>.

BitPesa Business Tips. Online: <https://www.bitpesa.co/bitpesa-makes-cross-border-business-easier>.

Blockchain Association of Africa. "Objectives," online: <https://www.blockchain.org.za/objectives.php>.

Canada Border Services Agency. "Uniform Regulations Chapters Three and Five of NAFTA, Memorandum D11-4-18" (27 October 2014), online: <https://www.cbsa-asfc.gc.ca/publications/dm-md/d11/d11-4-18-eng.html>.

Canada Tariff Finder. Online: <https://www.tariffinder.ca/>.

DFAT Free Trade Agreement Portal. Online: <https://ftaportal.dfat.gov.au/>.

Global Affairs Canada. "Minister of International Trade welcomes first round of negotiations with Mercosur countries in Ottawa" (20 March 2018), online: <https://www.canada.ca/en/global-affairs/news/2018/03/minister-of-international-trade-welcomes-first-round-of-negotiations-with-mercosur-countries-in-ottawa.html>.

International Chamber of Commerce. "ICC launches Artificial Intelligence tool for Trade Negotiations," (2 October 2018) *CISION PR Newswire*, online: <https://www.prnewswire.com/news-releases/icc-launches-artificial-intelligence-tool-for-trade-negotiations-300722232.html>.

Investment Policy Hub. "International Investment Agreements Navigator," online: <https://investmentpolicyhub.unctad.org/IIA/CountryBits/34>.

Market Access Map. Online: <https://www.macmap.org/>.

Non-Tariff Barriers: Trade Barriers in Africa. Online: <https://www.tradebarriers.org/>.

Research ICT Africa. "RIA Africa Mobile Pricing Indices Portal" (2019), online: <https://researchictafrica.net/ramp_indices_portal/>.

Rules of Origin Facilitator. Online: <https://findrulesoforigin.org/>.

Economist. "What Technology can do for Africa" (November 2017), online: <https://www.economist.com/special-report/2017/11/09/what-technology-can-do-for-africa>.

Thomson Reuters and KPMG International. "2016 Global Trade Management Survey" (2016), online: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2016/10/2016-global-trade-management-survey-from-thomson-reuters-and-kpmg-international.pdf>.

TradeLens Overview. Online: <https://docs.tradelens.com/learn/tradelens_overview/>.

United Nations Conference on Trade and Development (UNCTAD). "Information Economy Report 2017 - Digitalization, Trade and Development" (October 2017), online: <https://unctad.org/en/PublicationsLibrary/ier2017_en.pdf>.

UNCTAD. "Small economies welcome AI-enabled trade tool, but worries remain" (15 October 2018), online: <https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1881>.

UNCTAD. "Technical Notes on ICT for Development" B2C E-Commerce Index 2018, Focus on Africa" (2018), online: <https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d12_en.pdf>.

United Nations Economic Commission for Africa. "Regional Economic Communities" online: <https://www.uneca.org/oria/pages/regional-economic-communities>.

United Nations Economic Commission for Africa. "Chapter Seven: Movement of Goods and Services in Africa" in *Assessing Regional Integration in Africa V* (Addis Ababa, Ethiopia 2012).

United Nations Economic and Social Commission for Asia and the Pacific. "Towards a Single Single Window, Trading Environment: Senegal's Transition from a Paper-based System

to a Paperless Trading System" *Brief No. 5* (January 2011), online: < https://www.unescap.org/sites/default/files/brief5.pdf>.

World Bank. "Record High Remittances to Low- and Middle-Income Countries in 2017" Press Release (23 April 2018), online: <https://www.worldbank.org/en/news/press-release/2018/04/23/record-high-remittances-to-low-and-middle-income-countries-in-2017>

World Customs Organization. "Statement by Mr. Joakim Reiter, Deputy Secretary-General" (1 June 2016) *UNCTAD Transport and Trade Facilitation Newsletter*, no. 70, online: <https://unctad.org/en/PublicationsLibrary/webdtltlb2016d2_en.pdf>.

World Customs Organization. "WCO SAFE Framework of Standards" (2018), online: <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/safe-package/safe-framework-of-standards.pdf?la=en>.

World Trade Organization. "Technical Information on Rules of Origin", online: <https://www.wto.org/english/tratop_e/roi_e/roi_info_e.htm>

World Trade Organization. "Trade Facilitation Agreement Facility" (2015), online: <https://www.tfafacility.org/>.

World Trade Organization. "V: Global perspectives - who are the leading players?" in *World Statistical Review* 2018, online: <https://www.wto.org/english/res_e/statis_e/wts2018_e/wts2018chapter05_e.pdf>.

World Trade Organization. "World Trade Report 2018", online: <https://www.wto.org/english/res_e/publications_e/world_trade_report18_e.pdf>.